

April 11, 2003

TO: Jonathan Foreman, Art Unit 3736  
CP2, Room 4-B-24

FROM: Jeanne Horrigan  
ASRC Searcher in EIC3700

*JH*

SUBJECT: Search Results for Serial 09/938533

Attached are the search results for the partially implantable hearing system, including results of inventor and prior art searches in foreign/international patent databases and prior art searches in medical and general sci/tech non-patent literature databases.

The results are organized into three sets:

- Results of inventor search in foreign/international patent databases;
- Results of prior art search in foreign/international patent databases; and
- Results of non-patent literature search.

Results appear after the database names and search strategy used for those results. I tagged items that I thought seemed most relevant, but **I suggest that you review all of the results.**

Also attached is a search feedback form. Completion of the form is voluntary. Your completing this form would help us improve our search services.

I hope the attached information is useful. Please feel free to contact me (phone 305-5934 or email [jeanne.horrigan@uspto.gov](mailto:jeanne.horrigan@uspto.gov)) if you have any questions or need additional searching on this application.

*Jon -*

*I did not find the coupler between the transducer & micromanipulator, but perhaps it is because I did not use enough synonyms (or maybe it's in these results & I just did not understand them). The material tagged is mostly about the releasable coupler.*

*Please check all results.*

*Thanks,*

*Jeanne*

File 155:MEDLINE(R) 1966-2003/Apr W1  
 File 5:Biosis Previews(R) 1969-2003/Apr W1  
 File 73:EMBASE 1974-2003/Apr W1  
 File 34:SciSearch(R) Cited Ref Sci 1990-2003/Apr W1  
 File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec  
 File 144:Pascal 1973-2003/Mar W5  
 File 6:NTIS 1964-2003/Apr W1  
 File 8:Ei Compendex(R) 1970-2003/Mar W5  
 File 2:INSPEC 1969-2003/Mar W5  
 File 99:Wilson Appl. Sci & Tech Abs 1983-2003/Feb  
 File 65:Inside Conferences 1993-2003/Apr W1  
 File 94:JICST-EPlus 1985-2003/Apr W1  
 File 35:Dissertation Abs Online 1861-2003/Mar

| Set | Items   | Description  |
|-----|---------|--|
| S1  | 21751   | (COCHLEAR OR AUDIO OR AUDITORY OR HEAR OR HEARING) (3N) (IMPLANT? OR PROSTHESIS?)                              |
| S2  | 223881  | TRANSDUCER? ?  |
| S3  | 3794    | MICROMANIPULATOR? ? OR MICRO()MANIPULATOR? ?   |
| S4  | 4951    | CRANIAL()VAULT? ? OR NEUROCRANIUM? ? OR NEUROCRANIA OR BRAINCASE? ? OR BRAIN()CASE? ? OR CRANIUM(2N)CEREBRAL?? |
| S5  | 866334  | COUPLING OR COUPLER? ?   |
| S6  | 5172057 | RELEAS? OR REMOV? OR EXTRACT? OR DISENGAG? OR DISCONNECT? - OR DETACH?   |
| S7  | 133687  | SNAP? ? OR SNAPP??? OR SCREW????   |
| S8  | 11303   | (TAKE? ? OR TOOK OR TAKING) (3W)OUT  |
| S9  | 7       | S1 AND S2 AND S3 AND S5  |
| S10 | 13262   | S5(10N)S6:S8   |
| S11 | 0       | S9 AND S10   |
| S12 | 555756  | COCHLEAR OR AUDIO OR AUDITORY OR HEAR OR HEARING   |
| S13 | 1005647 | IMPLANT? OR PROSTHESIS?  |
| S14 | 7       | S12 AND S13 AND S2 AND S3 AND S5   |
| S15 | 2       | S14 AND S6:S8  |
| S16 | 2       | RD (unique items) [duplicates]   |
| S17 | 7       | S14 OR S9  |
| S18 | 5       | S17 NOT S15  |
| S19 | 3       | RD (unique items) [duplicates]   |

Searcher: Jeanne Horrigan  
Serial 09/938533  
April 11, 2003

2

File 95:TEME-Technology & Management 1989-2003/Mar W4  
File 98:General Sci Abs/Full-Text 1984-2003/Feb  
File 9:Business & Industry(R) Jul/1994-2003/Apr 10  
File 16:Gale Group PROMT(R) 1990-2003/Apr 10  
File 160:Gale Group PROMT(R) 1972-1989  
File 148:Gale Group Trade & Industry DB 1976-2003/Apr 10  
File 621:Gale Group New Prod.Annou.(R) 1985-2003/Apr 10  
Set Items Description  
S1 1811 (COCHLEAR OR AUDIO OR AUDITORY OR HEAR OR HEARING) (3N) (IMP-  
LANT? OR PROSTHES?S)  
S2 31577 TRANSDUCER? ?  
S3 372 MICROMANIPULATOR? ? OR MICRO()MANIPULATOR? ?  
S4 176 CRANIAL()VAULT? ? OR NEUROCRANIUM? ? OR NEUROCRANIA OR BRA-  
INCASE? ? OR BRAIN()CASE? ? OR CRANIUM(2N)CEREBRAL??  
S5 67529 COUPLING OR COUPLER? ?  
S6 4145170 RELEAS? OR REMOV? OR EXTRACT? OR DISENGAG? OR DISCONNECT? -  
OR DETACH?  
S7 197298 SNAP? ? OR SNAPP??? OR SCREW????  
S8 160227 (TAKE? ? OR TOOK OR TAKING) (3W)OUT  
S9 0 S1(S)S2(S)S3(S)S5  
S10 0 S1 AND S2 AND S3 AND S5  
S11 0 S2(S)S3(S)S5  
S12 14 S2 AND S3 AND S5  
S13 13 RD (unique items)  
S14 6 S13/2003 OR S13/2002 OR S13/2001  
S15 7 S13 NOT S14  
S16 7 Sort S15/ALL/PD,D

16/8/4 (Item 4 from file: 148)

DIALOG(R)File 148:(c)2003 The Gale Group. All rts. reserv.  
06813504 SUPPLIER NUMBER: 14522762 (USE FORMAT 7 OR 9 FOR FULL TEXT)  
1993 R&D 100 awards: technology's brightest stars: these winners sparkle!  
(Research and Development magazine)

Oct, 1993

WORD COUNT: 12635 LINE COUNT: 01133

SPECIAL FEATURES: illustration; photograph

INDUSTRY CODES/NAMES: ENG Engineering and Manufacturing

DESCRIPTORS: Research and Development (Periodical)--Achievements and  
awards; Chemistry, Analytic--Products; Automobile supplies industry--  
Achievements and awards; Scientific equipment and supplies--Achievements  
and awards; Biotechnology industry--Achievements and awards; Computer  
industry--Achievements and awards; Computer software industry--  
Achievements and awards; Consumer goods--Achievements and awards; Power  
resources--Achievements and awards; Environmental engineering--  
Achievements and awards; Imaging systems--Achievements and awards; Laser  
industry--Achievements and awards; Materials science--Achievements and  
awards; Medical equipment--Achievements and awards; Testing equipment  
industry--Achievements and awards; Thin film devices--Achievements and  
awards; Vacuum technology--Achievements and awards; Pharmaceutical  
industry--Achievements and awards

SIC CODES: 3714 Motor vehicle parts and accessories; 2836 Biological  
products exc. diagnostic; 3571 Electronic computers; 7372 Prepackaged  
software; 3823 Process control instruments; 3829 Measuring &  
controlling devices, not elsewhere classified; 2834 Pharmaceutical  
preparations; 2830 Drugs; 3840 Medical Instruments and Supplies; 3825  
Instruments to measure electricity; 3674 Semiconductors and related

Searcher: Jeanne Horrigan  
Serial 09/938533  
April 11, 2003

3

devices; 3589 Service industry machinery, not elsewhere classified

File 149:TGG Health&Wellness DB(SM) 1976-2003/Mar W5  
File 636:Gale Group Newsletter DB(TM) 1987-2003/Apr 10  
File 441:ESPICOM Pharm&Med DEVICE NEWS 2003/Apr W1  
File 442:AMA Journals 1982-2003/Aug B1  
File 444:New England Journal of Med. 1985-2003/Apr W2  
File 158:DIOGENES(R) 1976-2003/Apr W1  
File 187:F-D-C Reports 1987-2003/Apr W1  
File 195:FBODaily Jan 2003-2003/Apr 12

| Set | Items   | Description   |
|-----|---------|---|
| S1  | 4229    | (COCHLEAR OR AUDIO OR AUDITORY OR HEAR OR HEARING) (3N) (IMP-LANT? OR PROSTHES?S)                               |
| S2  | 13288   | TRANSDUCER? ?   |
| S3  | 230     | MICROMANIPULATOR? ? OR MICRO()MANIPULATOR? ?  |
| S4  | 218     | CRANIAL()VAULT? ? OR NEUROCRANIUM? ? OR NEUROCRANIA OR BRA-INCASE? ? OR BRAIN()CASE? ? OR CRANIUM(2N)CEREBRAL?? |
| S5  | 10123   | COUPLING OR COUPLER? ?  |
| S6  | 1008852 | RELEAS? OR REMOV? OR EXTRACT? OR DISENGAG? OR DISCONNECT? - OR DETACH?  |
| S7  | 43493   | SNAP? ? OR SNAPP??? OR SCREW????  |
| S8  | 32048   | (TAKE? ? OR TOOK OR TAKING) (3W)OUT   |
| S9  | 0       | S2(S)S3(S)S5  |
| S10 | 1       | S2 AND S3 AND S5 [not relevant]   |
| S11 | 18      | S1 (S)S5  |
| S12 | 0       | S6:S8(5N)S5 AND S11   |
| S13 | 9       | S6:S8 AND S11   |
| S14 | 9       | S13 NOT S10   |
| S15 | 9       | RD (unique items)   |
| S16 | 1       | S15/2003 OR S15/2002 OR S15/2001  |
| S17 | 8       | S15 NOT S16   |
| S18 | 8       | Sort S17/ALL/PD,D   |

18/8/4 (Item 4 from file: 187)

DIALOG(R)File 187:(c) 2003 F-D-C Reports Inc. All rts. reserv.  
00078653 F-D-C Accession Number 01180230031  
June 8, 1992

**FDA Recalls & Court Actions**

18/8/5 (Item 5 from file: 636)

DIALOG(R)File 636:(c) 2003 The Gale Group. All rts. reserv.  
01808883 Supplier Number: 43052502 (USE FORMAT 7 FOR FULLTEXT)  
**Class II Recalls and Field Corrections--Devices -- Manufacturer: Cochlear  
Proprietary Limited, New South Wales, Australia.**  
June 3, 1992

Word Count: 556

PUBLISHER NAME: Food & Drug Administration  
EVENT NAMES: \*350 (Product standards, safety, & recalls)  
GEOGRAPHIC NAMES: \*1USA (United States)  
PRODUCT NAMES: \*3842460 (Speech & Communications Aids)  
INDUSTRY NAMES: BUSN (Any type of business); DRUG (Pharmaceuticals and Cosmetics); FOOD (Food, Beverages and Nutrition); GOVT (Government and Law)  
NAICS CODES: 334510 (Electromedical and Electrotherapeutic Apparatus Manufacturing)

18/3,K/2 (Item 2 from file: 149)

DIALOG(R)File 149:TGG Health&Wellness DB(SM)  
(c) 2003 The Gale Group. All rts. reserv.

01897769 SUPPLIER NUMBER: 58562982 (USE FORMAT 7 OR 9 FOR FULL TEXT)

**Update on implants: Bone-anchored devices and middle ear implants.**

Chasin, Marshall

The Hearing Journal, 52, 7, 10

July, 1999

PUBLICATION FORMAT: Magazine/Journal ISSN: 0745-7472 LANGUAGE: English

RECORD TYPE: Fulltext TARGET AUDIENCE: Trade

WORD COUNT: 3697 LINE COUNT: 00294

... connection between living bone and an implanted material. Pure titanium is used for the implant **screw**, but research has also shown that some forms of stainless steel can also undergo osseointegration...

...were BAHAs first used and how is this made possible?

In this procedure, a titanium **screw** is implanted into the temporal bone behind the ear. The **screw** does not go through the bone, and patients can still do everything they did prior...

...he fitted on the patient. An external abutment (or mount) is connected to the implanted **screw**, and the BAHA can be joined to this abutment with a simple bayonette connector that can be **detached** with ease.

A major use of osseointegration has been in dental implants, where a specially trained dentist inserts a **screw** and abutment into the bone of the mouth. A false tooth (or teeth) can then...

...the temporal bone and the skin tissues are replaced, much as is done in a **cochlear implant**. Because of the layer of skin between the implanted magnet and the external coil, significant...been suggested that during acoustic neuroma surgery, if hearing could not be preserved, a titanium **screw** could be implanted on that side, which later could be used with a...

18/3,K/3 (Item 3 from file: 442)

DIALOG(R)File 442:AMA Journals

(c)2003 Amer Med Assn -FARS/DARS apply. All rts. reserv.

00098202

COPYRIGHT American Medical Association 1996

**Hearing Aids II. Implantable Hearing Aids (ARTICLE)**

GULYA, A. JULIANNA; STACH, BRAD

Archives of Otolaryngology

Apr, 1996; State of the Art: tzo363

LINE COUNT: 00452

... The Audiant stimulator comprises an implanted neodymium-iron-boron magnet incorporated into an osseointegrating orthopedic **screw** and an external processor with an electromagnetic coil. Permanent magnets in the implant and the processor...

...coil features a variety of magnet strengths.

The single-stage implantation procedure involves a postauricular incision, **screw** insertion by an orthopedic 'double tapping' technique, and subcutaneous tissue thinning as necessary--all of...

... not been associated with any death, disability, or long-term morbidity; three patients required device **removal** because of skin breakdown, while one **screw** failed to osseointegrate. In other series, /4-6/ the only complication has been that one...was found when single-stage and two-stage implantation were compared. Eleven additional implants were **removed**, most because of patient-related factors. Some 81% of patients never experienced any adverse skin... stimulators are realistic alternatives to bone-conduction hearing aids only in individuals with good **cochlear** reserve. **Implantable hearing** devices offer the potential advantages of diminishing feedback and sound distortion by eliminating the acoustic **coupling** obligatory in conventional hearing aids. Balanced against these

benefits are the risks inherent in any surgical implantation as well as the economic costs of the device. Continued evolution of conventional **hearing** aids and **implantable** devices will determine whether and to what extent the latter will be accepted as alternatives...

18/3,K/6 (Item 6 from file: 149)

DIALOG(R) File 149:TGG Health&Wellness DB(SM)

(c) 2003 The Gale Group. All rts. reserv.

01225628 SUPPLIER NUMBER: 09005466

**Percutaneous pedestal in cochlear implantation.**

Parkin, James L.

Annals of Otology, Rhinology and Laryngology, v99, n10, p796(5)

Oct, 1990

PUBLICATION FORMAT: Magazine/Journal ISSN: 0003-4894 LANGUAGE: English

RECORD TYPE: Abstract TARGET AUDIENCE: Professional

...ABSTRACT: hearing organ, is destroyed, but segments of the auditory nerve (the sensory nerve associated with **hearing**) remain, **cochlear implants** can often lead to the return of at least some **hearing**. The **cochlear implant** is an electrode system that is inserted into the bony cochlea and requires electrical signals...

...passes through the skin. While the pedestal method is potentially the best electrical means of **coupling** the electrode to its driving circuitry, the possibility of infection at the site of the...

...present study reports the use of the percutaneous pedestal method in a group of 42 **cochlear implant** patients. The pedestal implants were well-tolerated by most, but not all, patients. In some patients, irritation at a implant site required one of the securing **screws** to be **removed**, which resolved the difficulty. Despite the potential possibility of infection at the site of the...

CAPTIONS: Ineraid multichannel cochlear implant system. (diagram); Method and procedures. (diagram); Pull testing of symbion bone **screw**. (table); Photographs of percutaneous pedestal. (diagnostic image); Patient pedestal experience. (table); Pedestal experience of 42...

18/3,K/7 (Item 7 from file: 442)

DIALOG(R) File 442:AMA Journals

(c)2003 Amer Med Assn -FARS/DARS apply. All rts. reserv.

00036216

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**Implantable Hearing Aid; Report of the First Human Applications (CLINICAL NOTES)**

YANAGIHARA, NAOAKI; ARITOMO, HIROSHI; YAMANAKA, EIZO; GYO, KIYOFUMI

Archives of Otolaryngology

August, 1987; 113: 869-8721987;

LINE COUNT: 00129

WORD COUNT: 01790

... impulses are transmitted to the vibrator directly in contact with the stapes. In a totally **implantable hearing** aid (TIHA), the three components described above are implanted in and around the ear, together...

... the components. However, during the development of the device, it was discovered that a partially **implantable hearing** aid (PIHA) would have advantages of its own. In the PIHA, the ossicular vibrator is...

... load of the inner ear impedance when the vibrator is coupled with the stapes. Direct **coupling** of the vibrator to the stapes allows highly efficient transmission of acoustic energy to the...

... was cleaned as much as possible, and the incus and head of the malleus were **removed**. Because the orifice of the eustachian tube was closed and

all the mucoperiosteal membrane was...the patient. The retroauricular wound was reopened and granulomatous tissue in the middle ear was **removed**. First, a testing vibrator was attached to the head of the stapes, and good vibratory...

... installation was firmly fixed at the most appropriate position of the zygomatic root by two **screws**, and the position of the vibrator was adjusted. A ceramic tube was interposed between the...

18/3,K/8 (Item 8 from file: 158)

DIALOG(R) File 158:DIOGENES(R)

(c) 2003 DIOGENES. All rts. reserv.

00073436 DIOGENES RECORD NUMBER: 90840

**NUCLEUS 22 CHANNEL COCHLEAR IMPLANT (COCHLEAR): SUMMARY OF SAFETY AND EFFECTIVENESS DATA PP: 27.**

FDA NO.: F90-34759

DEVICE CLASSIFICATION: COCHLEAR IMPLANT.

COMPANY NAME: COCHLEAR

DEVICE/DRUG NO.: P890027

SOURCE: FOI SERVICES FULL TEXT (FT).

...less benefit than children who acquire deafness later in life.

### III. DEVICE DESCRIPTION

The Nucleus **Cochlear Implant** System is an implemented device used in conjunction with an externally worn speech processor. A...

... microphone converts speech into electrical signals, which are analyzed by the processor in order to **extract** specific information. This information is then encoded and transmitted via inductive **coupling** to an implanted receiver-stimulator. To transmit the information, a small, externally worn coil is...taste or balance, and noticeable change in head noise. Failure of the implant could require **removal**, replacement, or a reduction in the number of usable electrodes. There is no evidence that... tested and passed the following tests:

#### Physiochemical Test

Twenty grams of the test material were **extracted** for 24 hours in 100 ml of distilled water. Nonvolatile residue, residue on ignition, heavy...

...on ignition 5 mg

Heavy materials 0.0001%

Buffering capacity 10 ml

#### Acute Systemic Toxicity

**Extracts** from saline and cottonseed oil were injected into groups of mice (each group consisting of...

...systemic toxicity for up to 72 hours. There were no signs of toxicity.

#### Intracutaneous Toxicity

**Extracts** from saline and cottonseed oil were injected into rabbit skin and observed for local irritant...

...Ethylene Oxide Residual Analysis

Ethylene oxide (ETO), ethylene chlorhydrin (EC) and ethylene glycol (EG) were **extracted** and determined by the head space method (ETO) and gas chromatography (EC, EG). The residues...

... Nucleus cochlear implant packages intramuscularly in cats for a period of approximately four weeks. On **removal** of the implant, tissue biopsies were taken from tissue adjacent to all biomaterials, and bacteriological...  
...this minimal damage (Ref. 10).

It has been shown clinically that intracochlear electrodes can be **removed** and replaced without any apparent adverse effect on performance. However, mechanical injury from the insertion... an electrode array. Monopolar electrosurgical instruments must not be used within the vicinity



of an **implanted cochlear implant** and/or its electrode system. Induced currents could cause damage to the cochlear tissues or...  
...or a Parents Guide at the time of initial counseling.

**Clinical Considerations**

In children, the **removal** of one cochlear ...results in a palpable lump behind the ear. Failure of the implanted device could require **removal**, replacement or a reduction in the number of electrodes in use.

There is no evidence...

... may derive less benefit than children who acquire deafness later in life.

**Description**

The Nucleus **Cochlear Implant** System is an implanted device used in conjunction with an externally worn speech processor. A...

... microphone converts speech into electrical signals, which are analyzed by the processor in order to **extract** specific information. This information is then encoded and transmitted via inductive **coupling** to an implanted receiver-stimulator. To transmit the information, a small, externally worn coil is...

**18/3,AB/5 (Item 5 from file: 636)**

DIALOG(R) File 636:Gale Group Newsletter DB(TM)

(c) 2003 The Gale Group. All rts. reserv.

01808883 Supplier Number: 43052502

**Class II Recalls and Field Corrections--Devices -- Manufacturer: Cochlear  
Proprietary Limited, New South Wales, Australia.**

FDA Enforcement Report, pN/A

June 3, 1992

Language: English Record Type: Fulltext

Document Type: Newsletter; Trade

Word Count: 556

Searcher: Jeanne Horrigan  
Serial 09/938533  
April 11, 2003

9

File 350:Derwent WPIX 1963-2003/UD,UM &UP=200324  
File 347:JAPIO Oct 1976-2002/Dec(Updated 030402)  
File 371:French Patents 1961-2002/BOPI 200209

| Set | Items   | Description  |
|-----|---------|--|
| S1  | 473     | (COCHLEAR OR AUDIO OR AUDITORY OR HEAR OR HEARING) (3N) (IMPLANT? OR PROSTHESIS?)                              |
| S2  | 105430  | TRANSDUCER? ?  |
| S3  | 586     | MICROMANIPULATOR? ? OR MICRO()MANIPULATOR? ?   |
| S4  | 31      | CRANIAL()VAULT? ? OR NEUROCRANIUM? ? OR NEUROCRANIA OR BRAINCASE? ? OR BRAIN()CASE? ? OR CRANIUM(2N)CEREBRAL?? |
| S5  | 409611  | COUPLING OR COUPLER? ?   |
| S6  | 2532084 | RELEAS? OR REMOV? OR EXTRACT? OR DISENGAG? OR DISCONNECT? - OR DETACH?   |
| S7  | 452325  | SNAP? ? OR SNAPP??? OR SCREW????   |
| S8  | 130688  | (TAKE? ? OR TOOK OR TAKING) (3W)OUT  |
| S9  | 4833    | IC=H04R-025  |
| S10 | 1388    | IC=A61F-011/00   |
| S11 | 357     | IC=A61F-002/18   |
| S12 | 3       | S2 AND S3 AND S5   |
| S13 | 1       | S12 AND S9:S11 [a duplicate]   |
| S14 | 2       | S12 NOT S13  |
| S15 | 2       | S1 AND S6:S8(10N)S5  |
| S16 | 1       | S15 NOT S12  |
| S17 | 329     | S5 AND S9:S11  |
| S18 | 35989   | S6:S8(10N)S5   |
| S19 | 17      | S9:S11 AND S18   |
| S20 | 15      | S19 NOT (S12 OR S16)   |

14/26, TI/1 (Item 1 from file: 350)  
DIALOG(R) File 350:Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
007963275  
WPI Acc No: 1989-228387/198932  
**Opto-electric coupler for telecommunications - has opto-electronic transducer mounted on metal block as heat-sink supporting optical fibre end**

14/26, TI/2 (Item 2 from file: 350)  
DIALOG(R) File 350:Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
004183817  
WPI Acc No: 1985-010697/198502  
**Biological tissue micromanipulator - has four input spiral piezoelectric transducer with longitudinal polarization**

16/7/1 (Item 1 from file: 350)  
DIALOG(R) File 350:Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
010772796 \*\*Image available\*\*  
WPI Acc No: 1996-269749/199628  
**Disconnection device for implant coupling at hearing aids - comprises two coupling parts, one elastically retained in recess provided in other**  
Patent Assignee: P & B RES AB (PBRE-N)  
Inventor: CARLSSON P; HAKANSSON B  
Number of Countries: 014 Number of Patents: 006  
Patent Family:  
Patent No Kind Date Applicat No Kind Date Week

*duplicate of 16/3, K/1 on pages 15-17*

|             |    |          |             |   |          |        |   |
|-------------|----|----------|-------------|---|----------|--------|---|
| EP 715839   | A2 | 19960612 | EP 95850213 | A | 19951130 | 199628 | B |
| SE 9404189  | A  | 19960603 | SE 944189   | A | 19941202 | 199633 |   |
| SE 503790   | C2 | 19960902 | SE 944189   | A | 19941202 | 199641 |   |
| US 5935170  | A  | 19990810 | US 95566043 | A | 19951201 | 199938 |   |
|             |    |          | US 97941492 | A | 19970930 |        |   |
| EP 715839   | B1 | 20020911 | EP 95850213 | A | 19951130 | 200264 |   |
| DE 69528138 | E  | 20021017 | DE 628138   | A | 19951130 | 200276 |   |
|             |    |          | EP 95850213 | A | 19951130 |        |   |

Priority Applications (No Type Date): SE 944189 A 19941202

Cited Patents: No-SR.Pub

Patent Details:

| Patent No  | Kind | Lan | Pg | Main IPC    | Filing Notes                    |
|--|------|-----|----|-------------|---------------------------------|
| EP 715839  | A2   | E   | 9  | A61F-011/04 |                                 |
| Designated States (Regional): AT BE CH DE DK ES FR GB IE IT LI NL SE |      |     |    |             |                                 |
| SE 9404189   | A    |     |    | H04R-025/02 |                                 |
| SE 503790  | C2   |     |    | H04R-025/02 |                                 |
| US 5935170   | A    |     |    | A61F-002/28 | Cont of application US 95566043 |
| EP 715839  | B1   | E   |    | A61F-011/04 |                                 |
| Designated States (Regional): AT BE CH DE DK ES FR GB IE IT LI NL SE |      |     |    |             |                                 |
| DE 69528138  | E    |     |    | A61F-011/04 | Based on patent EP 715839       |

Abstract (Basic): EP 715839 A

At least one of the coupling parts (6,11) is provided with at least one member (19), which together with the other coupling part (11,6) in at least one mutual rotational position for the two coupling parts, have a total added axial longitudinal measure, which give the part introduced in the recess a clearance to the other coupling part in interconnected position. This together with the other coupling part in at least one other mutual rotational position have an overall added axial longitudinal measure, which does not permit the coupling parts to be interconnected.

The coupling parts without axial influence upon the implant are brought apart during the mutual rotation of the coupling parts to the , at least one other mutual rotational portion.

ADVANTAGE - Avoids implant becoming loose from the skull.

Dwg.3/7

Derwent Class: P32

International Patent Class (Main): A61F-002/28; A61F-011/04; H04R-025/02

International Patent Class (Additional): H04R-025/00

**20/26, TI/2 (Item 2 from file: 350)**

DIALOG(R) File 350: Derwent WPIX

(c) 2003 Thomson Derwent. All rts. reserv.

012999338

WPI Acc No: 2000-171190/200015

**Shape memory polymer tubing and microtubing for a gripper/release mechanism in microfabricated therapeutic actuators including a release sensing system and coupling arrangements for directing light**

**20/26, TI/3 (Item 3 from file: 350)**

DIALOG(R) File 350: Derwent WPIX

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012914433

WPI Acc No: 2000-086269/200007

**Ambidextrous ear canal sound delivery tube system**

**20/26, TI/5 (Item 5 from file: 350)**

DIALOG(R) File 350:Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
011526135

WPI Acc No: 1997-502621/199746

**Microphone protecting apparatus - has shield and coupling that may wedge against housing for frictionally securing shield and coupling to housing**

**20/26, TI/8 (Item 8 from file: 350)**

DIALOG(R) File 350:Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
010423411

WPI Acc No: 1995-324731/199542

**Waterproof hearing aid - uses screw fixed to electrode causing first and second case half-body to be attached to one another enabling power supply from battery into signal processing unit positioned on second half-body case**

**20/26, TI/9 (Item 9 from file: 350)**

DIALOG(R) File 350:Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
009189999

WPI Acc No: 1992-317435/199239

**Hearing aid with switched push-pull output stage - uses feedback signal representing earphone element switch state controlling output circuit impedance**

**20/26, TI/10 (Item 10 from file: 350)**

DIALOG(R) File 350:Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
008114117

WPI Acc No: 1990-001118/199001

**Passive loudspeaker housing for TV receiver - has single metal screening element for loudspeaker magnet eliminating stray field interference**

**20/26, TI/12 (Item 12 from file: 350)**

DIALOG(R) File 350:Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
004496676

WPI Acc No: 1986-000020/198601

**Hearing-aid fitting completely into outer ear - has flexible sealing stopper with cylindrical inner and mushroom-like outer folded back**

**20/26, TI/13 (Item 13 from file: 350)**

DIALOG(R) File 350:Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
004155189

WPI Acc No: 1984-300728/198448

**Coupling element for hearing aid - has disc shaped part snapped onto exit nipple with rotatable bent tube and spout giving great positional freedom**

**20/26, TI/14 (Item 14 from file: 350)**

DIALOG(R) File 350:Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
003633284

WPI Acc No: 1983-J1486K/198324

**Coupling for bone-anchored hearing aid - has vibration transmitting surface located within coupling which lies flush with skin surface**

20/26, TI/15 (Item 15 from file: 350)  
DIALOG(R) File 350: Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
001881597

WPI Acc No: 1978-B0828A/197805

**Modular hearing air with attachable housing - has flexible tubing  
connected at one end to coupler**

20/7/1 (Item 1 from file: 350)  
DIALOG(R) File 350: Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
013365859 \*\*Image available\*\*  
WPI Acc No: 2000-537798/200049

**Minimum contact exchange-type acoustic coupler used in hearing aid,  
consists of snap ring having flattened cylinder and dome-shaped cap  
integrally formed, made of elastomer**

Patent Assignee: DECIBEL INSTR INC (DECI-N)

Inventor: ANDERSON G F; BROWN J; ROUW S; ANDERSON G A

Number of Countries: 028 Number of Patents: 004

Patent Family:

| Patent No     | Kind | Date     | Applicat No | Kind | Date     | Week     |
|---------------|------|----------|-------------|------|----------|----------|
| JP 2000209322 | A    | 20000728 | JP 2000155  | A    | 20000104 | 200049 B |
| CA 2293052    | A1   | 20000630 | CA 2293052  | A    | 19991222 | 200050   |
| US 6129174    | A    | 20001010 | US 98224817 | A    | 19981230 | 200052   |
| EP 1039779    | A2   | 20000927 | EP 99126161 | A    | 19991230 | 200053   |

Priority Applications (No Type Date): US 98224817 A 19981230

Patent Details:

| Patent No     | Kind | Lan | Pg | Main IPC     | Filing Notes |
|---------------|------|-----|----|--------------|--------------|
| JP 2000209322 | A    |     | 11 | H04M-001/215 |              |
| CA 2293052    | A1   | E   |    | H04R-001/10  |              |
| US 6129174    | A    |     |    | A61B-007/02  |              |
| EP 1039779    | A2   | E   |    | H04R-025/00  |              |

Designated States (Regional): AL AT BE CH CY DE DK ES FI FR GB GR IE IT  
LI LT LU LV MC MK NL PT RO SE SI

Abstract (Basic): JP 2000209322 A

**NOVELTY** - The acoustic **coupler** is made of **snap** ring which has a flattened cylinder and cap. The cap and snap ring are made of elastomer.

**USE** - For use in hearing aid, telephone receiver.

**ADVANTAGE** - Does not give a user unpleasant feeling and guarantees optimum acoustic capability.

**DESCRIPTION OF DRAWING(S)** - The figure shows sectional view of acoustic coupler.

pp; 11 DwgNo 2/12

Derwent Class: P31; W01

International Patent Class (Main): A61B-007/02; H04M-001/215; H04R-001/10;  
**H04R-025/00**

20/7/11 (Item 11 from file: 350)  
DIALOG(R) File 350: Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
007048223  
WPI Acc No: 1987-048220/198707

**Hearing aid with skull attachment - has part contg. oscillator fitted  
close to skull and transmitting sound via implantable coupling**

Searcher: Jeanne Horrigan  
Serial 09/938533  
April 11, 2003

13

Patent Assignee: HAKANSSON B (HAKA-I)  
Inventor: CARLSSON  
Number of Countries: 002 Number of Patents: 003  
Patent Family:

| Patent No  | Kind | Date     | Applicat No | Kind | Date     | Week     |
|------------|------|----------|-------------|------|----------|----------|
| SE 8502341 | A    | 19861111 | SE 852341   | A    | 19850510 | 198707 B |
| SE 447947  | B    | 19861222 |             |      |          | 198702   |
| US 4904233 | A    | 19900227 | US 87136456 | A    | 19871221 | 199015   |

Priority Applications (No Type Date): SE 852341 A 19850510

Patent Details:

| Patent No  | Kind | Lan | Pg | Main IPC | Filing Notes |
|------------|------|-----|----|----------|--------------|
| SE 8502341 | A    |     | 10 |          |              |

Abstract (Basic): SE 8502341 A

A vibration-producing unit (7) is **releasable** connectable via a number of electrically acting **coupling** units (14) to an external unit of the hearing aid, which unit comprises at least a microphone. The external unit also incorporates a battery which, together with the microphone and other items, e.g. amplifiers, is enclosed in a casing(13).

The vibration-producing part is accommodated in a unit integrated with the coupling (1), to which it is firmly attached by being integral with it, or is connectable to the skull. The unit comprises a socket-shaped part, which passes through the skin of the user from the skull outwards, and has an internal hollow space in which the vibration-producer may be accommodated.

ADVANTAGE - To reduce volume of sound in hearing aid which is connectable to skull of user, and to minimise problem of component vibration. (Provisional basic advised week 87/01)

1/4

Abstract (Equivalent): US 4904233 A

A housing includes an interior cavity anchored to a fixture and extending in a direction away from the skull bone through the skin of the wearer. An oscillator (7) is releasably disposed within the interior cavity of the housing for producing mechanical vibration of the information to the skull of the wearer in response to electrical signals. A lid is provided for the housing. A first electrical connector in the lid connects to the oscillator.

A casing has a microphone and an amplifier. A battery power supply is interconnected and disposed within the casing, being connected to a second electrical connector. The first and the second electrical connector are being adapted to be releasably interconnected.

USE - Hearing aid providing mechanical transmission of sound information to the skull bone. (5pp)

Derwent Class: S05; W04

International Patent Class (Additional): H04R-025/00

File 348:EUROPEAN PATENTS 1978-2003/Apr W01

File 349:PCT FULLTEXT 1979-2002/UB=20030410,UT=20030403

| Set | Items  | Description  |
|-----|--------|--|
| S1  | 573    | (COCHLEAR OR AUDIO OR AUDITORY OR HEAR OR HEARING) (3N) (IMPLANT? OR PROSTHESIS?)                              |
| S2  | 48730  | TRANSDUCER? ?  |
| S3  | 873    | MICROMANIPULATOR? ? OR MICRO()MANIPULATOR? ?   |
| S4  | 93     | CRANIAL()VAULT? ? OR NEUROCRANIUM? ? OR NEUROCRANIA OR BRAINCASE? ? OR BRAIN()CASE? ? OR CRANIUM(2N)CEREBRAL?? |
| S5  | 211222 | COUPLING OR COUPLER? ?   |
| S6  | 873086 | RELEASE? OR REMOVE? OR EXTRACT? OR DISENGAGE? OR DISCONNECT? - OR DETACH?                                      |
| S7  | 195885 | SNAP? ? OR SNAPP??? OR SCREW????   |
| S8  | 37463  | (TAKE? ? OR TOOK OR TAKING) (3W)OUT  |
| S9  | 1758   | IC=H04R-025  |
| S10 | 294    | IC=A61F-011/00   |
| S11 | 107    | IC=A61F-002/18   |
| S12 | 1      | S1 AND S2(S)S3(S)S5  |
| S13 | 26090  | S5(10N)S6:S8   |
| S14 | 39     | S13 AND S9:S11   |
| S15 | 13     | S1 AND S14   |
| S16 | 12     | S15 NOT S12  |
| S17 | 14902  | S5(3N)S6:S8  |
| S18 | 29     | S17 AND S9:S11   |
| S19 | 18     | S18 NOT S15  |

16/6/4 (Item 4 from file: 348)

00243948

Cochlear implant system with psychological testing or programming with mapped patient responses provided to encoder.

16/6/5 (Item 1 from file: 349)

00983652

**VIBRATOR DAMPING**

Publication Year: 2003

16/6/7 (Item 3 from file: 349)

00859933 \*\*Image available\*\*

**BONE CONDUCTING HEARING AID**

Publication Year: 2001

16/6/8 (Item 4 from file: 349)

00859932 \*\*Image available\*\*

**VIBRATOR FOR BONE CONDUCTED HEARING AIDS**

Publication Year: 2001

16/6/9 (Item 5 from file: 349)

00859931 \*\*Image available\*\*

**VIBRATOR FOR BONECONDUCTED HEARING AIDS**

Publication Year: 2001

16/6/10 (Item 6 from file: 349)

00817238 \*\*Image available\*\*

**DIRECT TYMPANIC DRIVE VIA A FLOATING FILAMENT ASSEMBLY**

Publication Year: 2001

16/6/11 (Item 7 from file: 349)  
00378830 \*\*Image available\*\*  
**AN APPARATUS AND METHOD FOR MONITORING MAGNETIC AUDIO SYSTEMS**  
Publication Year: 1997

16/6/12 (Item 8 from file: 349)  
00266124  
**HEARING AID HAVING LIQUID TRANSMISSION MEANS**  
Publication Year: 1994

16/3,K/1 (Item 1 from file: 348)  
DIALOG(R) File 348:EUROPEAN PATENTS  
(c) 2003 European Patent Office. All rts. reserv.  
00762926  
**A connecting device for implant coupling at hearing aids**  
**Vorrichtung fur implantierte Kupplung in Horhilfen**  
**Dispositif de connexion pour accouplement d'un implant pour une prothese**  
**auditive**

**PATENT ASSIGNEE:**

P & B RESEARCH AB, (2064870), Splintvedsgatan 7, 416 80 Goteborg, (SE),  
(Proprietor designated states: all)

**INVENTOR:**

Hakansson, Bo, Splintvedsgatan 7, S-416 80 Goteborg, (SV)  
Carlsson, Peder, Prastvagen 7649, S-442 93 Kungälv, (SV)

**LEGAL REPRESENTATIVE:**

Hammond, Andrew et al (74678), Strom & Gulliksson IP AB, Sjöporten 4, 417  
64 Goteborg, (SE)

**PATENT (CC, No, Kind, Date):** EP 715839 A2 960612 (Basic)  
EP 715839 A3 980311  
EP 715839 B1 020911

**APPLICATION (CC, No, Date):** EP 95850213 951130;

**PRIORITY (CC, No, Date):** SE 944189 941202

**DESIGNATED STATES:** AT; BE; CH; DE; DK; ES; FR; GB; IE; IT; LI; NL; SE

**INTERNATIONAL PATENT CLASS:** A61F-011/04; **H04R-025/00**

**ABSTRACT WORD COUNT:** 277

**NOTE:** Figure number on first page: 3

**LANGUAGE (Publication,Procedural,Application):** English; English; English

**FULLTEXT AVAILABILITY:**

| Available Text | Language  | Update | Word Count |
|----------------|-----------|--------|------------|
| CLAIMS A       | (English) | EPAB96 | 503        |
| CLAIMS B       | (English) | 200237 | 514        |
| CLAIMS B       | (German)  | 200237 | 468        |
| CLAIMS B       | (French)  | 200237 | 570        |
| SPEC A         | (English) | EPAB96 | 2239       |
| SPEC B         | (English) | 200237 | 2204       |

Total word count - document A 2742

Total word count - document B 3756

Total word count - documents A + B 6498

...INTERNATIONAL PATENT CLASS: **H04R-025/00**

...SPECIFICATION is connected to an implant anchored in the skull bone of a person with impaired hearing, wherein the implant constitutes or supports a first coupling member intended for connection to a second coupling part...

...has been provided with flexing means for making it possible to effect manual interconnection and disconnection of the coupling parts.

However, this resiliency must not be too soft, in order to ascertain a



safe...

...drawings.

Fig. 1 shows in a cross section and in coupling position a type of **coupling** device, which preferably is provided with a **disconnection** device according to the invention,

Fig. 2 is an illustration, partially in section, of a...

...aid connected thereto,

Fig. 3 shows in a view corresponding to Fig. 1 the same **coupling** position, but with a covering washer forming part of the **disconnection** device shown in un-sectioned position,

Fig. 4 is a section corresponding to Fig. 3, but with the parts of the **coupling** shown in **disconnection** position.

Figs 5-7 show in three different views, partially in cross section, a second one of the **coupling** device, which also forms part of the **disconnection** device according to the invention.

Fig. 1 shows in cross section a **coupling** device 1 provided with a **disconnection** device according to the invention. However, it must be pointed out that the use of the **disconnection** device is not limited to the embodiment of the **coupling** device 1 shown, but this does only form an example of a **coupling** device wherein the **disconnection** device according to the invention can be included as an essential part.

The coupling device...

...coupling part having a central through bore, through which extends the shaft of the spacer **screw** 5. The edge of the **screw** head retains the first **coupling** part 6 against the area about the bore in the flange fixture. On its side the side wall 7 in the first **coupling** part, and the head of the **screw** is covered by a cap-formed covering washer 10, which at its upper portion leaves...

...is preferably manufactured from plastic material, and forms one of the vital members of the **disconnection** device such as described in detail hereinafter.

The **coupling** device 1 also incorporates a second coupling part 11, which, as can be seen from...

...groove 16 is brought out off engagement with the annular bead 9 in the first **coupling** part 6. At such **disconnection**, the implant is subjected to equally big forces in the connection direction by the wall ...of a hearing apparatus.

It also shall be mentioned again that the design of the **coupling** device shown is not critical for the function of the **disconnection** device, but other types of the couplings mentioned in the introduction can in similar manner...

...a separate covering washer, but they can be arranged directly in the material of the **coupling** part or the spacer **screw**. The wall portions of different length and the bosses can in the same manner be...

...SPECIFICATION is connected to an implant anchored in the skull bone of a person with impaired **hearing**, wherein the **implant** constitutes or supports a first coupling member intended for connection to a second coupling part...

...has been provided with flexing means for making it possible to effect manual interconnection and **disconnection** of the **coupling** parts. However, this resiliency must not be too soft, in order to ascertain a safe...

...coupling part having a central through bore, through which extends the shaft of the spacer **screw** 5. The edge of the **screw** head retains the first **coupling** part 6 against the area about the bore in the flange fixture. On its side...thus protrudes upwards inside the space formed by

the side wall 7 in the first **coupling** part, and the head of the **screw** is covered by a cap-formed covering washer 10, which at its upper portion leaves...

...groove 16 is brought out off engagement with the annular bead 9 in the first **coupling** part 6. At such **disconnection**, the implant is subjected to equally big forces in the connection direction by the wall ...a separate covering washer, but they can be arranged directly in the material of the **coupling** part or the spacer **screw**. The wall portions of different length and the bosses can in the same manner be...

...CLAIMS and a second coupling part (6 and 11, resp.), one of which parts (11) in **coupling** position being elastically retained by **snap** -action in a recess provided in the other one of the parts (6), said recess...

...axial longitudinal measure, which gives the part introduced in the recess and retained therein by **snap** -action a clearance to the other **coupling** part in interconnected position, and which together with the other coupling part in at least...

...other mutual rotational position have an overall added axial longitudinal measure, which will cause a **release** of the **snap** -in action of the **coupling** parts, whereby the **coupling** parts without axial influence upon the implant are brought apart during the mutual rotation of...

16/3,K/2 (Item 2 from file: 348)

DIALOG(R) File 348:EUROPEAN PATENTS

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00762925

A device in hearing aids

Vorrichtung fur Horhilfe

Dispositif pour prothese auditive

PATENT ASSIGNEE:

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(Proprietor designated states: all)

INVENTOR:

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Carlsson, Peder, Prastvagen 7649, S-442 93 Kungälv, (SE)

LEGAL REPRESENTATIVE:

Hammond, Andrew et al (74678), Strom & Gulliksson IP AB, Sjoporten 4, 417 64 Goteborg, (SE)

PATENT (CC, No, Kind, Date): EP 715838 A2 960612 (Basic)

EP 715838 A3 980311

EP 715838 B1 030219

APPLICATION (CC, No, Date): EP 95850212 951130;

PRIORITY (CC, No, Date): SE 944188 941202

DESIGNATED STATES: AT; BE; CH; DE; DK; ES; FR; GB; IE; IT; LI; NL; SE

INTERNATIONAL PATENT CLASS: A61F-011/04; H04R-025/00

ABSTRACT WORD COUNT: 127

NOTE: Figure number on first page: 1

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

| Available Text | Language  | Update | Word Count |
|----------------|-----------|--------|------------|
| CLAIMS A       | (English) | EPAB96 | 241        |
| CLAIMS B       | (English) | 200308 | 256        |
| CLAIMS B       | (German)  | 200308 | 259        |
| CLAIMS B       | (French)  | 200308 | 283        |
| SPEC A         | (English) | EPAB96 | 1993       |

SPEC B (English) 200308 2031  
Total word count - document A 2234  
Total word count - document B 2829  
Total word count - documents A + B 5063  
...INTERNATIONAL PATENT CLASS: **H04R-025/00**

...SPECIFICATION or has been provided with flexing means for making it possible to effect interconnection and **disconnection** of the **coupling** parts manually.

At skin penetrating implants it is desirable that the side (the outer side...thus protrudes upwards inside the space formed by the side wall 10 in the first **coupling** part, whereby the head of the **screw** does not completely fill out this space thus that a annular space is formed. In...

...SPECIFICATION B1

The present invention refers to a combination of a skull bone anchored **hearing aid implant** and a device for interconnecting it with a coupling part.

In hearing aids intended to be interconnected to an implant anchored in the skull bone of a person with impaired **hearing**, said **implant** acting as a first coupling part, there is a need of a device incorporating a...  
...or has been provided with flexing means for making it possible to effect interconnection and **disconnection** of the **coupling** parts manually.

Such devices are disclosed in WO 83 02047.

At skin penetrating implants it...thus protrudes upwards inside the space formed by the side wall 10 in the first **coupling** part, whereby the head of the **screw** does not completely fill out this space thus that a annular space is formed. In...

...CLAIMS implant (2) adapted to be anchored in the skull bone of a person with impaired **hearing**, which **implant** acts as a first coupling part (7), a second coupling part, and a device for...

16/3,K/3 (Item 3 from file: 348)  
DIALOG(R) File 348:EUROPEAN PATENTS  
(c) 2003 European Patent Office. All rts. reserv.  
00243949

Cochlear implant prosthesis current switching and power supply.  
**Stromschalteinrichtung und Stromversorgung für eine in die Cochlea implantierte Prothese.**  
**Dispositif de distribution et d'alimentation en courant pour une prothese cochleaire implantable.**

PATENT ASSIGNEE:

THE COMMONWEALTH OF AUSTRALIA, (344920), Department of Science & Technology Entrance 5, Benjamin Offices, Belconnen Town Center  
Australian Capital Territory 2616, (AU), (applicant designated states: DE;FR;GB;SE)

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LEGAL REPRESENTATIVE:

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PATENT (CC, No, Kind, Date): EP 247649 A1 871202 (Basic)

EP 247649 B1 920304  
APPLICATION (CC, No, Date): EP 87200717 840409;  
PRIORITY (CC, No, Date): US 483806 830411  
DESIGNATED STATES: DE; FR; GB; SE  
RELATED PARENT NUMBER(S) - PN (AN):  
EP 124930  
INTERNATIONAL PATENT CLASS: A61F-011/04; H04R-025/00  
ABSTRACT WORD COUNT: 120  
LANGUAGE (Publication,Procedural,Application): English; English; English  
FULLTEXT AVAILABILITY:

| Available Text                     | Language  | Update | Word Count |
|------------------------------------|-----------|--------|------------|
| CLAIMS B                           | (English) | EPABF1 | 185        |
| SPEC B                             | (English) | EPABF1 | 25767      |
| Total word count - document A      |           |        | 0          |
| Total word count - document B      |           |        | 25952      |
| Total word count - documents A + B |           |        | 25952      |

Cochlear implant prosthesis current switching and power supply.

...INTERNATIONAL PATENT CLASS: H04R-025/00

...SPECIFICATION B1

COCHLEAR IMPLANT PROSTHESIS CURRENT SWITCHING AND POWER SUPPLY  
BACKGROUND OF THE INVENTION

The invention described is primarily for a cochlear prosthesis, or implantable hearing prosthesis system, or bionic ear. That is, a system of components designed with the object of...

...is no way nerve impulses can be generated from sound in the normal manner.

The cochlear implant system seeks to bypass these hair cells in the cochlea by presenting electrical stimulation to...

...of function can be partially restored.

In the system described herein, and in some other cochlear implant systems in the prior art, the stimulating electrode or electrodes is surgically placed in the...is possible to convey prosodic information to the patient. This idea is used by some cochlear implant systems as the sole method of information transmission, and may be performed with a single...

...are not independently variable with stimulation rate, electrode position, and stimulation amplitude.

Some systems of cochlear implants in the prior art are arranged to stimulate a number of electrodes simultaneously in proportion...utilized in the invention described herein.

It is necessary to be able to configure the cochlear implant system to take account of each individual patient's psychophysical responses to stimulation. The system...the handicap in people suffering from profound sensorineural hearing loss, by means of an improved cochlear implant system.

Considering the requirements of a cochlear implant system, and some of the deficiencies of prior art systems pointed out above, the aims...

...inside the human body;

to provide a means for transmitting power and information to the implanted cochlear stimulator across the skin without requiring a break in the skin;  
to provide a means...

...stimulus basis and derived from an acoustic signal;

to provide a means for configuring the cochlear implant system to take account of each patient's unique characteristics, and to be able to...

...function without resort to extra surgery, or custom-made implantable

components; and  
to design the **cochlear implant** system with the primary aim of improved speech communication, but also providing an awareness of...  
...cross-section of the cochlea, respectively.

Figure 2 is a block diagram of the overall **cochlear implant** system of this invention.

Figure 3 is a pictorial view of the components of the...  
...24 illustrates the state and output timing of the output switching circuit.

#### DETAILED DESCRIPTION

##### The **Cochlear Implant** System

The **cochlear implant** system of this invention shown in Figure 2 comprises several components.

An Electrode Array 1...high quality microphone to be handed around in a social situation.

Each component of the **cochlear implant** system will be discussed in more detail in the following sections

The Speech Processing Strategy...to pattern the stimulation such that the stimuli are gated at the Fo rate.

The **cochlear implant** system described herein is not limited to any one particular speech processing strategy. Indeed, it...

...The question of electrode electrochemistry and charge balance are thought to be more important in **cochlear implants** than in, say, cardiac pacemakers which are well known in the art. This is because...

...nerve tissues may be more susceptible to damage due to electrical stimulation, and thus the **cochlear implant** system described herein has been designed with more stringent safety factors than cardiac pacemakers.

The...

...the electrodes to overcome the problem of charge asymmetry. The need for capacitors in a **cochlear implant** puts constraints on the minimum volume possible, since one capacitor would be required for each...have found it to be an aid in finding suspected problems with the apparatus.

##### The **Cochlear Implant** in Use

In use, the patient locates the coil unit and microphone behind the ear...

...be plugged.

##### Receiver Stimulator (IMPLANT); General Description

A diagrammatic representation of the Receiver/Stimulator, or **cochlear implant**, is shown in Fig. 5. Power and data is from a single externally worn coil...rectifier circuit built around an operational amplifier 106. The rectified signal has the DC level removed by AC coupling in a capacitor 107 which introduces a zero at about 70 Hz, and is then...defined before. START pulses occurring during a frame are ignored. This is important for a **cochlear implant** encoder since it is essential for the power/data signal format described above for all...

...effect and all frames will be finished. This is an important safety feature in the **cochlear implant** system, as it would be potentially dangerous or uncomfortable to the patient if the frame...and stimulation parameters merely by altering the software in the DPU. Thus, as experience with **cochlear implants** accrues, and more psychophysics information is available, more stimulation strategies or mapping algorithms may be...

...CLAIMS array is implanted in a patient's ear and the electrical signals are indicative of **auditory** information.

4 . The **prosthesis** of claim 1 including means to connect one

electrode to the current sink and all...

16/3,K/6 (Item 2 from file: 349)

DIALOG(R)File 349:PCT FULLTEXT

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00971780 \*\*Image available\*\*

**HEARING AID APPARATUS**

**APPAREIL DE CORRECTION AUDITIVE**

Patent Applicant/Assignee:

P & B RESEARCH AB, Splintvedsgatan 7, S-416 80 Goteborg, SE, SE

(Residence), SE (Nationality), (For all designated states except: US)

Patent Applicant/Inventor:

WESTERKULL Patrick, Hovas Hagstig 26A, S-436 54 Hovas, SE, -- (Residence)

, -- (Nationality), (Designated only for: US)

Legal Representative:

WESTERKULL Patrik (agent), Entific Medical Systems AB, Box 16024, S-412  
21 Goteborg, SE,

Patent and Priority Information (Country, Number, Date):

Patent: WO 200301846 A1 20030103 (WO 0301846)

Application: WO 2002SE1089 20020606 (PCT/WO SE0201089)

Priority Application: SE 20012208 20010621

Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU

CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP

KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO

RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG US UZ VN YU ZA ZM ZW

(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR

(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG

(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW

(EA) AM AZ BY KG KZ MD RU TJ TM

Publication Language: English

Filing Language: Swedish

Fulltext Word Count: 2130

Main International Patent Class: H04R-025/00

Fulltext Availability:

Detailed Description

Detailed Description

... lv be connected to 'Che implan'Ced titanium fixture by means

AV of a bayonet **coupling** or a **snap** in coupl ing .

However, these hearing aW devices ha,7e substanlt:ia'llly been  
designed...hearing aid,

figure 2 illustrates an alternative embodiment of the in  
vention in which the **hearing** aid is partially **implanted** ,  
and

figure 3 illustrates an alternative solution with a parti  
ally **implanted** **hearing** aid in which the implantable part  
is arranged on the good (non deaf) side of...

19/6/1 (Item 1 from file: 348)

01245952

**Programming system for programming hearing aids**

19/6/2 (Item 2 from file: 348)

00816876

**PROCESS FOR CONTROLLING A PROGRAMMABLE OR PROGRAM-CONTROLLED HEARING AID  
FOR ITS IN-SITU FITTIN ADJUSTMENT**

19/6/3 (Item 3 from file: 348)  
00301989  
Otoscope and flexible, disposable curette for use therewith.

19/6/4 (Item 4 from file: 348)  
00272505  
Hearing aid ear piece having disposable, compressible polymeric foam sleeve.

19/6/7 (Item 3 from file: 349)  
00787951 \*\*Image available\*\*  
FLOW NOZZLE AND SYRINGE  
Publication Year: 2001

19/6/8 (Item 4 from file: 349)  
00542551 \*\*Image available\*\*  
TWO-WAY COMMUNICATION EARPIECE  
Publication Year: 2000

19/6/9 (Item 5 from file: 349)  
00537826 \*\*Image available\*\*  
AMBIDEXTROUS SOUND DELIVERY TUBE SYSTEM  
Publication Year: 2000

19/6/11 (Item 7 from file: 349)  
00478569 \*\*Image available\*\*  
INTRALUMINAL RETRIEVAL CATHETER  
Publication Year: 1999

19/6/14 (Item 10 from file: 349)  
00352074 \*\*Image available\*\*  
FLUIDLY EXPANDABLE URETHRAL PLUG ASSEMBLY WHICH RECEIVES FLUID FROM AN  
EXTERNAL SOURCE AND METHOD FOR CONTROLLING URINARY INCONTINENCE  
Publication Year: 1996

19/6/16 (Item 12 from file: 349)  
00231485 \*\*Image available\*\*  
AN EAR-CLEANSING APPARATUS  
Publication Year: 1993

19/3,K/5 (Item 1 from file: 349)  
DIALOG(R)File 349:PCT FULLTEXT  
(c) 2003 WIPO/Univentio. All rts. reserv.  
00989905  
EAR COUPLER  
COUPLEUR AUDITIF

Patent Applicant/Assignee:

NATUS MEDICAL INC, 1501 Industrial Road, San Carlos, California 94070, US  
, US (Residence), US (Nationality)

Inventor(s):

JESSICA Ash, 1501 Industrial Road, San Carlos, Californie 94070, US,  
ALFRED Christian Walton, 1295 North Road, Belmont, California 94002, US,

Legal Representative:

DANIEL Maguire (agent), Attorney at Law, 423 E St., Davis, California  
95616, US,

Patent and Priority Information (Country, Number, Date):

Patent: WO 200319982 A2 20030306 (WO 0319982)

Application: WO 2002US27111 20020826 (PCT/WO US0227111)  
Priority Application: US 2001941132 20010827  
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU  
CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP  
KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO  
RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VC VN YU ZA ZM ZW  
(EP) AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LU MC NL PT SE SK TR  
(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG  
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW  
(EA) AM AZ BY KG KZ MD RU TJ TM

Publication Language: English  
Filing Language: English  
Fulltext Word Count: 3201  
Main International Patent Class: H04R-025/00  
Fulltext Availability:

Detailed Description  
Claims

English Abstract

...coupler advantageously conforms to the subject's head, thereby minimizing the likelihood that the ear **coupler** will become **detached** during testing. The **coupler** can be inexpensively manufactured, since its one-piece design allows the use of relatively low...

Detailed Description

... Other features of the preferred embodiment of the present invention include a tab to facilitate **removal** of the ear **coupler**, and ...the center of the coupler.

Before being attached to the subject's head, the ear **couplers** are attached to **release** paper. Preferably, the adhesive that secures the ear **couplers** to the **release** paper (and to the subject's head) is a hydrogel, which can be selectively applied...adhesive is hydrogel, although other adhesives could be used so long as they allow the **coupler** to be **removably** attached to the subject's head.

Previous ear couplers have used a laminate for adhesion...be punched from a sheet of hydrogel 5 @

I The tab is also useful in **removing** the ear **coupler** from the **release** paper.

Before use, the ear coupler is provided to the user attached to release paper depending on the operator's preference. The ear **coupler**, 10, is then **removed** from the release paper and placed on the subject's head, so as to cover...

...position during testing to accommodate the particular position of the subject. After testing, the ear **coupler** is **removed**, using the tab. The present ear coupler is much less likely to become detached during...

Claim

... wall and said annular side wall;  
port in said annular side wall; and  
means for **removably** attaching the ear **coupler** to a subject's head. 16.) The ear coupler according to claim 15, wherein said...as to create an interference fit with said acoustic transducer assembly; and a means for **removably** attaching the ear **coupler** to a subject's head.  
25.) An ear coupler comprising:  
an annular side wall;...



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00971779 \*\*Image available\*\*

**A COUPLING DEVICE FOR A TWO-PART BONE-ANCHORED HEARING AID APPARATUS  
DISPOSITIF DE COUPLAGE POUR APPAREIL AUDITIF A ANCRAGE OSSEUX EN DEUX  
PARTIES**

Patent Applicant/Assignee:

P & B RESEARCH AB, Splintvedsgatan 7, S-416 80 Goteborg, SE, SE  
(Residence), SE (Nationality), (For all designated states except: US)

Patent Applicant/Inventor:

WESTERKULL Patrick, Hovas Hagstig 26A, S-436 54 Hovas, SE, SE (Residence)  
, SE (Nationality), (Designated only for: US)

Legal Representative:

WESTERKULL Patrik (agent), Entific Medical Systems AB, Box 16024, S-412  
21 Goteborg, SE,

Patent and Priority Information (Country, Number, Date):

Patent: WO 200301845 A1 20030103 (WO 0301845)

Application: WO 2002SE1088 20020606 (PCT/WO SE0201088)

Priority Application: SE 20012207 20010621

Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU

CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP

KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO

RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG US UZ VN YU ZA ZM ZW

(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR

(OA) BF BJ CG CI CM GA GN GQ GW ML MR NE SN TD TG

(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW

(EA) AM AZ BY KG KZ MD RU TJ TM

Publication Language: English

Filing Language: Swedish

Fulltext Word Count: 1757

Main International Patent Class: H04R-025/00

Fulltext Availability:

Detailed Description

Detailed Description

... It can easily be

connected to the implanted titanium fixture by means of a  
bayonet **coupling** or a **snap** in coupling. Examples of this  
type of hearing aid devices are described in US Patents...

19/3,K/10 (Item 6 from file: 349)

DIALOG(R)File 349:PCT FULLTEXT

(c) 2003 WIPO/Univentio. All rts. reserv.

00523907 \*\*Image available\*\*

**HEARING COUPLER SHELLS OF SOFT PLIABLE THERMOPLASTIC MATERIAL  
COQUES DE COUPLAGE POUR APPAREIL AUDITIF EN MATERIAU THERMOPLASTIQUE MOU ET  
SOUPLE**

Patent Applicant/Assignee:

SOUND PARTS INC,

Inventor(s):

CSENSICH Peter J,

GEDEON Barbara J,

BLOCH Gerald,

CASTOR Gerald,

Patent and Priority Information (Country, Number, Date):

Patent: WO 9955259 A1 19991104

Application: WO 99US9232 19990428 (PCT/WO US9909232)

Priority Application: US 9883489 19980429; US 9884465 19980506

Searcher: Jeanne Horrigan  
Serial 09/938533  
April 11, 2003

25

Designated States: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES  
FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU  
LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA  
UG UZ VN YU ZW GH GM KE LS MW SD SL SZ UG ZW AM AZ BY KG KZ MD RU TJ TM  
AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE BF BJ CF CG CI CM  
GA GN GW ML MR NE SN TD TG

Publication Language: English

Fulltext Word Count: 5372

Main International Patent Class: **A61F-002/18**

Fulltext Availability:

Detailed Description

Detailed Description

... further processing.

A cavity 280 will remain in the shell where the dummy member was **removed**.

The hearing **coupler**, customized for the individual user if necessary,  
is inserted into the 1 5 cavity in...

19/3,K/12 (Item 8 from file: 349)

DIALOG(R)File 349:PCT FULLTEXT

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00475830 \*\*Image available\*\*

**ACOUSTIC COUPLER**

**COUPLEUR ACOUSTIQUE**

Patent Applicant/Assignee:

DECIBEL INSTRUMENTS INC,

Inventor(s):

SHENNIB Adnan,

FLETCHER Henry,

Patent and Priority Information (Country, Number, Date):

Patent: WO 9907182 A2 19990211

Application: WO 98US13890 19980707 (PCT/WO US9813890)

Priority Application: US 97902401 19970729

Designated States: AL AU BA BB BG BR CA CN CU CZ EE GE GW HU ID IL IS JP KP  
KR LC LK LR LT LV MG MK MN MX NO NZ PL RO SG SI SK SL TR TT UA UZ VN YU  
GH GM KE LS MW SD SZ UG ZW AM AZ BY KG KZ MD RU TJ TM AT BE CH CY DE DK  
ES FI FR GB GR IE IT LU MC NL PT SE BF BJ CF CG CI CM GA GN ML MR NE SN  
TD TG

Publication Language: English

Fulltext Word Count: 8033

Main International Patent Class: **H04R-025/02**

International Patent Class: **H04R-025/00**

Fulltext Availability:

Detailed Description

Claims

English Abstract

An acoustic **coupler** is **detachably** secured to a receiver assembly for  
deep insertion into an individual's ear canal. The...

...outside the ear canal. Applying a rotational (twist) force with respect  
to the receiver housing **detaches** the acoustic **coupler** from the  
receiver housing. Because rotational movements are minimal during  
insertion or **removal** of the **coupler** from the individual's ear,  
accidental detachment is not possible.

Detailed Description

... provide improved acoustic sealing and user comfort when positioned  
within an ear canal. The acoustic **coupler** is **detachably** secured to a  
receiver assembly for deep insertion into the ear canal. The acoustic

coupler...However, by applying a rotational (twist) force with respect to the receiver housing, the acoustic **coupler** can be easily **detached** from the receiver housing. Because rotational movements are minimal during insertion or **removal** of the **coupler** from the ear, accidental detachment is not possible. This unique snap on, twist off...

...friendly cartridge for the dispensing and attaching of the acoustic coupler. The dispensing cartridge contains **removable** acoustic **couplers** whereby the consumer can push the receiver assembly of the earpiece against the coupler within the dispensing cartridge and cause the **coupler** to **snap** on. The consumer subsequently **removes** the **coupler** from the dispensing cartridge for insertion and use in the ear canal, thus preventing unnecessary...

...forces;

Figure 6a is a cross section of an elliptical receiver housing and an elliptical **coupling** sleeve before **detachment** ;

Figure 6b is a cross section of an elliptical receiver housing and an elliptical coupling...no. 'MGTIOZ, manufactured by Mark 10, was used for measuring rotational torque required for normal **detachment** of the acoustic **coupler** .

For purposes of the discussion herein, the test parameters are defined as follows.

Axial Attachment...

...housing;

Axial Detachment Force (Fax-ded) is the peak axial force in Newtons required to **detach** the acoustic **coupler** from the receiver housing; Rotational Detachment Torque (jrot-d,t) is the peak torque in Newton-centimeters required to **detach** the acoustic **coupler** from the receiver housing; and  
2) Earpiece Removal Force (Fep-reni) is the peak force...

...the axial attachment forces and the earpiece removal forces, thus minimizing the opportunity for accidental **detachment** of the acoustic **coupler** outside and within the ear canal. The results also confirm that because the rotational detachment torque is minimal, rotational detachment represents the preferred method of **detaching** the acoustic **coupler** from the receiver housing.

Although the invention is described herein with reference to the preferred...

Claim

... attaching said acoustic coupler to said receiver assembly, and a rotational, twist off mechanism for **detaching** said acoustic **coupler** from said receiver assembly. 3 . The acoustic coupler of Claim 1, wherein said means for...

...attaching said acoustic coupler to said receiver assembly, and a squeeze and pull mechanism for **detaching** said acoustic **coupler** from said receiver assembly. 4 . The acoustic coupler of Claim 1. wherein said acoustic coupler...attaching said acoustic coupler to said receiver assembly, and a rotational, twist off mechanism for **detaching** said acoustic **coupler** from said receiver assembly.

30 The intracanal earpiece of Claim 28, wherein said means for...

...attaching said acoustic coupler to said receiver assembly, and a squeeze and pull mechanism for **detaching** said acoustic **coupler** from said receiver assembly.

31 The intracanal earpiece ...said acoustic seal has either a lubricous coating or an additive that facilitates insertion or **removal** of said acoustic **coupler** within an individual's ear canal.

48 The intracanal earpiece of Claim 34, wherein said...

19/3,K/13 (Item 9 from file: 349)

DIALOG(R) File 349:PCT FULLTEXT

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00405306 \*\*Image available\*\*

**UNIVERSAL SELF-ATTACHING INDUCTIVE COUPLING UNIT FOR CONNECTING HEARING  
INSTRUMENT TO PERIPHERAL ELECTRONIC DEVICES**

**UNITE DE COUPLAGE INDUCTIF UNIVERSELLE AUTO-FIXANTE POUR CONNECTER UN  
APPAREIL AUDITIF A DES DISPOSITIFS ELECTRONIQUES PERIPHERIQUES**

Patent Applicant/Assignee:

MULTITECH PRODUCTS (PTE) LTD,

TONG Yit Chow,

CHANG Joseph Sylvester,

Inventor(s):

TONG Yit Chow,

CHANG Joseph Sylvester,

Patent and Priority Information (Country, Number, Date):

Patent: WO 9746050 A1 19971204

Application: WO 97SG21 19970523 (PCT/WO SG9700021)

Priority Application: SG 969892 19960525

Designated States: DE US AT BE CH DE DK ES FI FR GB GR IE IT LU MC NL PT SE

Publication Language: English

Fulltext Word Count: 2470

Main International Patent Class: H04R-025/00

Fulltext Availability:

Detailed Description

Claims

Detailed Description

... a number of peripheral 0 electronic devices.

FIG. 4 is a perspective view illustrating the removal of the coupling unit from the hearing instrument.

5 DETAILED DESCRIPTION OF THE INVENTION

The present invention is...hooks, friction joints, etc., so long as the attaching means can facilitate easy attachment and removal of the coupling unit to the hearing instrument. Of course, for these cases, the cylindrical magnet and ferromagnetic...

Claim

... said acoustic peripheral electronic devices;

1 0 a non-magnetic means for easily attaching and removing the coupling unit

1 1 to said hearing instrument;

whereby said receiving coil is electromagnetically induced by...

19/3,K/15 (Item 11 from file: 349)

DIALOG(R) File 349:PCT FULLTEXT

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00338822

**ARTICULATED HEARING DEVICE**

**DISPOSITIF DE CORRECTION AUDITIVE ARTICULE**

Patent Applicant/Assignee:

DECIBEL INSTRUMENTS INC,

Inventor(s):

SHENNIB Adnan,

URSO Richard,

Patent and Priority Information (Country, Number, Date):

Patent: WO 9621334 A1 19960711  
Application: WO 95US17113 19951227 (PCT/WO US9517113)  
Priority Application: US 94365913 19941229  
Designated States: AM AU BB BG BR BY CA CN CZ DK ES FI GE HU JP KG KP KR KZ  
LK LT LV MD MG MN NO NZ PL RO RU SI SK TJ TT UA UZ VN KE LS MW SD SZ UG  
AT BE CH DE DK ES FR GB GR IE IT LU MC NL PT SE BF BJ CF CG CI CM GA GN  
ML MR NE SN TD TG  
Publication Language: English  
Fulltext Word Count: 8500  
Main International Patent Class: H04R-025/00  
Fulltext Availability:  
Detailed Description  
Detailed Description

... module and a connector that is detachable from a three-pin  
connector 150 via a **coupler screw** 151 and a **coupling** nut 152. Other  
**detachable** areas, not shown, may include the center of the connector,  
the receiver-connector junction, and...

19/3,K/17 (Item 13 from file: 349)  
DIALOG(R) File 349:PCT FULLTEXT  
(c) 2003 WIPO/Univentio. All rts. reserv.  
00121391

**A COUPLING ELEMENT FOR A HEARING AID**  
**ELEMENT DE COUPLAGE POUR PROTHESE AUDITIVE**

Patent Applicant/Assignee:

TO PHOLM & WESTERMANN I S,  
TO PHOLM Christian,

Inventor(s):

TO PHOLM Christian,

Patent and Priority Information (Country, Number, Date):

Patent: WO 8404645 A1 19841122  
Application: WO 84DK38 19840515 (PCT/WO DK8400038)  
Priority Application: DK 217183 19830516

Designated States: AT BE CH DE FI FR GB JP LU NL NO SE US

Publication Language: English

Fulltext Word Count: 1496

Main International Patent Class: H04R-025/02

Fulltext Availability:

Detailed Description

Detailed Description

... US Patent Specification 4 069 400 shows a substantially triangular  
hearing aid housing with a **coupling** element **removably** placed on an edge face  
and forming a sound exit spout. The availability of a...

19/3,K/18 (Item 14 from file: 349)  
DIALOG(R) File 349:PCT FULLTEXT  
(c) 2003 WIPO/Univentio. All rts. reserv.  
00114352

**COUPLING TO A BONE-ANCHORED HEARING AID**  
**ACCOUPLLEMENT POUR UN APPAREIL DE PROTHESE AUDITIVE ANCREE DANS L'OS**

Patent Applicant/Assignee:

HAOKANSSON Bo,

Inventor(s):

HAOKANSSON Bo,

Patent and Priority Information (Country, Number, Date):

Patent: WO 8302047 A1 19830609

Application: WO 82SE411 19821201 (PCT/WO SE8200411)  
Priority Application: SE 817161 19811201  
Designated States: AT BE CH DE DK FI FR GB JP NL NO US  
Publication Language: English  
Fulltext Word Count: 4315  
Main International Patent Class: H04R-025/00  
Fulltext Availability:

Detailed Description  
Detailed Description

... that coupling part the sender with its- cup-shaped coupling part is attached with a ' **snap** lock".

This known **coupling** has a number of drawbacks. For example 15 the ball-shaped coupling part sticking out...of the patient, This part, which in the embodiment shown here consists of a first **coupling** pArt q, is **screwed** 30 tightly by amounting screw 10 in a bone screw 2 of titanium in the same way as the known **coupling**. The bone **screw** is in turn surgically inserted into the skull bone of the patient, for example behind...or the active element, The coupling is further angle stable, that is because the second **coupling's** raised parts **snap** down into the... snapping mechanism" which is the case for the known **coupling**. The **snap** in such a locking mechanism which occurs at the moment of locking and which is...

File 350:Derwent WPIX 1963-2003/UD,UM &UP=200324  
File 347:JAPIO Oct 1976-2002/Dec(Updated 030402)  
File 371:French Patents 1961-2002/BOPI 200209

| Set | Items | Description                               |
|-----|-------|---|
| S1  | 8     | AU='MULLER G M'                           |
| S2  | 1     | AU='MULLER GERD M'                        |
| S3  | 57    | AU='LEYSIEFFER H' OR AU='LEYSIEFFER HANS' |
| S4  | 3     | AU='LEYSIEFFNER H'                        |
| S5  | 5     | S1:S2 AND S3:S4                           |

5/26,TI/1 (Item 1 from file: 350)

DIALOG(R)File 350:Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
014756273  
WPI Acc No: 2002-576977/200262

Fastening for microphone implanted in auditory channel, includes enlarged, resilient cylindrical section making friction fit in bore, for axial fixation

5/26,TI/3 (Item 3 from file: 350)

DIALOG(R)File 350:Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
014088562  
WPI Acc No: 2001-572776/200165

Stimulator and tester of hearing comprises electromechanical transformer, positioner, fixer, and sprung intermediate piece

5/26,TI/4 (Item 4 from file: 350)

DIALOG(R)File 350:Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
013974444  
WPI Acc No: 2001-458657/200150

Mechanical coupling of the drive stage in an implanted hearing aid vibrator stage

5/26,TI/5 (Item 1 from file: 347)

DIALOG(R)File 347:JAPIO  
(c) 2003 JPO & JAPIO. All rts. reserv.  
07350105  
FIXING ELEMENT FOR INSERTION MICROPHONE

5/7/2 (Item 2 from file: 350)

DIALOG(R)File 350:Derwent WPIX  
(c) 2003 Thomson Derwent. All rts. reserv.  
014235904 \*\*Image available\*\*  
WPI Acc No: 2002-056602/200208

Implantable hearing system, includes a detachable coupling for securing and locating a transducer and a micro-manipulator

Patent Assignee: COCHLEAR LTD (COCH-N); IMPLEX HEARING TECHNOLOGY AG (IMPL-N); LEYSIEFFER H (LEYS-I); MULLER G M (MULL-I)  
Inventor: LEYSIEFFER H ; MULLER G; MUELLER G M; MULLER G M  
Number of Countries: 028 Number of Patents: 004  
Patent Family:

| Patent No      | Kind | Date     | Applicat No   | Kind | Date     | Week     |
|----------------|------|----------|---------------|------|----------|----------|
| DE 10047388    | C1   | 20020110 | DE 1047388    | A    | 20000925 | 200208 B |
| US 20020038072 | A1   | 20020328 | US 2001938533 | A    | 20010827 | 200225   |

Searcher: Jeanne Horrigan  
Serial 09/938533  
April 11, 2003

31

EP 1191816 A2 20020327 EP 2001118055 A 20010725 200229  
AU 200163611 A 20020328 AU 200163611 A 20010823 200235  
Priority Applications (No Type Date): DE 1047388 A 20000925

Patent Details:

| Patent No | Kind | Lang | Pg | Main IPC | Filing Notes |
|-----------|------|------|----|----------|--------------|
|-----------|------|------|----|----------|--------------|

|             |    |  |    |             |  |
|-------------|----|--|----|-------------|--|
| DE 10047388 | C1 |  | 15 | H04R-025/02 |  |
|-------------|----|--|----|-------------|--|

|                |    |  |  |             |  |
|----------------|----|--|--|-------------|--|
| US 20020038072 | A1 |  |  | H04R-025/00 |  |
|----------------|----|--|--|-------------|--|

|            |    |   |  |             |  |
|------------|----|---|--|-------------|--|
| EP 1191816 | A2 | G |  | H04R-025/00 |  |
|------------|----|---|--|-------------|--|

Designated States (Regional): AL AT BE CH CY DE DK ES FI FR GB GR IE IT  
LI LT LU LV MC MK NL PT RO SE SI TR

|              |   |  |  |             |  |
|--------------|---|--|--|-------------|--|
| AU 200163611 | A |  |  | H04R-025/00 |  |
|--------------|---|--|--|-------------|--|

Abstract (Basic): DE 10047388 C1

NOVELTY - A detachable coupling (21, 22) between an  
electromechanical transducer (12) and a micro-manipulator (18) secures  
and locates them together. Release of the coupling permits removal of  
the transducer from the micro-manipulator.

USE - An implantable hearing system.

ADVANTAGE - Should a defect occur in the transducer, replacement  
procedures are facilitated. If appropriate, it is relatively easy to  
replace the transducer with improved versions.

DESCRIPTION OF DRAWING(S) - The partially cross-sectioned micro  
manipulator and transducer are seen in situ.

Transducer (12)

Micro-manipulator (18)

Detachable coupling (21, 22)

pp; 15 DwgNo 3/11

Derwent Class: A96; P32; W04

International Patent Class (Main): H04R-025/00; H04R-025/02

International Patent Class (Additional): A61F-002/18; A61F-011/00



File 348:EUROPEAN PATENTS 1978-2003/Apr W01

File 349:PCT FULLTEXT 1979-2002/UB=20030410,UT=20030403

Set Items Description

S1 4 S1:S2

S2 40 AU='MULLER GERD' OR AU='MULLER GERD DIPL ING':AU='MULLER G-  
ERD M DR RER NAT DR DIPL PHYS'

S3 50 AU='LEYSIEFFER' OR AU='LEYSIEFFER HANS DIPL ING DR':AU='LE-  
YSIEFFER HANS DR ING'

S4 11 S2 AND S3

S5 7 S4 NOT S1

5/6/1 (Item 1 from file: 348)

01230306

Device for mechanical coupling of a driver to a coupling part of the  
ossicular chain

5/6/2 (Item 2 from file: 348)

01212687

Device for mechanical coupling of a electromechanical hearing aid  
transducer implantable in a cavity in the mastoid

5/6/3 (Item 3 from file: 348)

01121046

Protection device for a rechargeable electrochemical battery

5/6/4 (Item 4 from file: 348)

01103485

Method and device for supplying electric energy to a partially implanted  
active device

5/6/5 (Item 5 from file: 348)

01034166

Anchoring means for implantable microphone

5/6/6 (Item 6 from file: 348)

00910244

Implantable microphone

5/6/7 (Item 7 from file: 348)

00888764

Implantable positioning and fixation system for actoric and sensoric  
implants

File 155:MEDLINE(R) 1966-2003/Apr W1  
File 5:Biosis Previews(R) 1969-2003/Apr W1  
File 73:EMBASE 1974-2003/Apr W1  
File 34:SciSearch(R) Cited Ref Sci 1990-2003/Apr W1  
File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec

| Set | Items  | Description   |
|-----|--------|---|
| S1  | 33     | AU='MULLER G M' OR AU='MULLER G MARTIN'                           |
| S2  | 3      | AU='MULLER G.-M.'   |
| S3  | 10     | AU='MULLER G.M.'  |
| S4  | 18     | AU='MULLER GM'  |
| S5  | 8      | AU='MULLER GERD' OR AU='MULLER GERD M'                            |
| S6  | 110    | AU='LEYSIEFFER H' OR AU='LEYSIEFFER H.' OR AU='LEYSIEFFER - HANS' |
| S7  | 3      | S1:S5 AND S6  |
| S8  | 3      | RD (unique items)   |
| S9  | 783952 | COUPL?  |
| S10 | 522994 | IMPLANT?  |
| S11 | 337718 | COCHLEAR OR AUDIO OR AUDITORY OR HEAR OR HEARING                  |
| S12 | 176    | S1:S6 NOT S7  |
| S13 | 96     | S12 AND S10 AND S11   |
| S14 | 55     | S13 AND S9  |
| S15 | 34     | RD (unique items)   |
| S16 | 3      | S15/2003 OR S15/2002 OR S15/2001                                  |
| S17 | 31     | S15 NOT S16   |
| S18 | 5      | S17/2000  |
| S19 | 5      | Sort S18/ALL/PY,D   |
| S20 | 26     | S17 NOT S18   |
| S21 | 26     | Sort S20/ALL/PY,D   |

8/7/3 (Item 3 from file: 5)

DIALOG(R)File 5:Biosis Previews(R)

(c) 2003 BIOSIS. All rts. reserv.

13040957 BIOSIS NO.: 200100248106

**Process and device for supply of an at least partially implanted active device with electric power.**

AUTHOR: Leysieffer Hans (a); Muller Gerd M

AUTHOR ADDRESS: (a)Taufkirchen\*\*Germany

JOURNAL: Official Gazette of the United States Patent and Trademark Office  
Patents 1239 (3):pNo Pagination Oct. 17, 2000

MEDIUM: e-file

ISSN: 0098-1133

DOCUMENT TYPE: Patent

RECORD TYPE: Abstract

LANGUAGE: English

**ABSTRACT:** An improved implantable thermoelectric energy converter for converting thermal energy generated by an implant wearer into electrical power for supplying electric power to an at least partially implanted active device, the implantable thermoelectric energy converter including a hot pole, a cold pole, and a plurality of individual modules electrically coupled to one another disposed between the hot pole and the cold pole. In particular, the hot pole thermally couples one end of the plurality of individual modules to an implantation site having a temperature substantially that of a core body temperature and the cold pole thermally couples another end of the plurality of individual modules to an implantation site closer to an outer skin surface of the implant wearer. In another embodiment, the implantable thermoelectric energy

converter may also include an implantable energy storage for collecting and temporarily storing the electric power generated. In accordance with still another embodiment of the present invention, the cold pole of the implantable thermoelectric energy converter may form a cooling body having an enlarged surface area which is adapted to be positioned directly under a skin surface of the implant wearer. In yet another embodiment, the implantable thermoelectric energy converter may be implanted in the skull or neck area of the implant wearer's body.

19/6/4 (Item 4 from file: 155)

09144666 20445645 PMID: 10993549

**In vivo experiments in the cat with an implantable piezoelectric hearing aid transducer.**

2000

19/6/5 (Item 5 from file: 155)

08908102 20195322 PMID: 10733184

**Human studies of a piezoelectric transducer and a microphone for a totally implantable electronic hearing device.**

Mar 2000

19/7/1 (Item 1 from file: 5)

DIALOG(R)File 5:Biosis Previews(R)

(c) 2003 BIOSIS. All rts. reserv.

13072694 BIOSIS NO.: 200100279843

**Transducer arrangement for partially or fully implantable hearing aids.**

AUTHOR: **Leysieffer Hans** (a

AUTHOR ADDRESS: (a)Taufkirchen\*\*Germany

JOURNAL: Official Gazette of the United States Patent and Trademark Office  
Patents 1241 (3):pNo Pagination Dec. 19, 2000

MEDIUM: e-file

ISSN: 0098-1133

DOCUMENT TYPE: Patent

RECORD TYPE: Abstract

LANGUAGE: English

ABSTRACT: The invention relates to a transducer for a partially or fully **implantable** hearing aids for direct mechanical excitation of the middle or inner ear. The transducer is provided with a housing fixedly mounted at the **implantation** site and a **coupling** element moveable with respect to the housing for transmitting vibration to the middle ear ossicle or directly to the inner ear. The housing accommodates an electromagnetic component such as a coil which is fixed relative to the housing and a vibratory component such as a permanent magnet which is mechanically connected to the **coupling** element such that the vibration of the vibratory component is transferred to the **coupling** element.

19/7/2 (Item 2 from file: 5)

DIALOG(R)File 5:Biosis Previews(R)

(c) 2003 BIOSIS. All rts. reserv.

13017966 BIOSIS NO.: 200100225115

**Partially or fully implantable hearing aid.**

AUTHOR: **Leysieffer Hans** (a

AUTHOR ADDRESS: (a)Taufkirchen\*\*Germany

JOURNAL: Official Gazette of the United States Patent and Trademark Office  
Patents 1238 (4):pNo Pagination Sep. 26, 2000

MEDIUM: e-file

ISSN: 0098-1133

DOCUMENT TYPE: Patent

RECORD TYPE: Abstract

LANGUAGE: English

ABSTRACT: The invention relates to a transducer for partially or fully **implantable hearing** aids for direct mechanical excitation of the middle or inner ear. The transducer is provided with a housing fixedly mounted at the **implantation** site and a **coupling** element moveable with respect to the housing for transmitting vibration to the middle ear ossicle or directly to the inner ear. The housing accommodates a piezoelectric element with which the **coupling** element can be vibrated and an electromagnet arrangement including an electromagnetic component, such as an electromagnetic coil, fixedly mounted relative to the housing and a vibratory component, such as a permanent magnet, mechanically connected to the **coupling** element such that the vibration of the vibratory component is transferred to the **coupling** element.

19/7/3 (Item 3 from file: 5)

DIALOG(R)File 5: Biosis Previews(R)

(c) 2003 BIOSIS. All rts. reserv.

12938056 BIOSIS NO.: 200100145205

Method for coupling an electromechanical transducer of an implantable hearing aid or tinnitus masker to a middle ear ossicle.

AUTHOR: Leysieffer Hans (a

AUTHOR ADDRESS: (a) Taufkirchen\*\*Germany

JOURNAL: Official Gazette of the United States Patent and Trademark Office  
Patents 1235 (3):pNo Pagination June 20, 2000

MEDIUM: e-file

ISSN: 0098-1133

DOCUMENT TYPE: Patent

RECORD TYPE: Abstract

LANGUAGE: English

ABSTRACT: A method for **coupling** an electromechanical transducer of a partially or totally **implantable hearing** aid and/or tinnitus masker to a middle ear ossicle of a **hearing** impaired person which is to be stimulated. The **hearing** aid and/or tinnitus masker includes the electromechanical transducer, a transducer positioning and fixing device, and an elongated **coupling** rod driven by the transducer, the elongated **coupling** rod having a tip. The method of the present invention includes performing a mastoidectomy to provide a mastoid cavity adapted for receiving the **hearing** aid and/or tinnitus masker transducer, passing the **coupling** rod through the natural passage of the aditus ad antrum, positioning and fixing the **hearing** aid and/or tinnitus masker transducer within the mastoid cavity with the elongated **coupling** rod passing through the aditus ad antrum, and contacting the tip of the elongated **coupling** rod with the ossicle to be stimulated.

21/6/1 (Item 1 from file: 73)

07456456 EMBASE No: 1998370936

First implantations of a totally implantable electronic hearing system for sensorineural hearing loss

ERSTE IMPLANTATIONEN EINES VOLLSTANDIG IMPLANTIERBAREN ELEKTRONISCHEN HÖRSYSTEMS BEI PATIENTEN MIT INNENOHRSCHWERHÖRIGKEIT  
1998

21/9/2 (Item 1 from file: 155)

DIALOG(R) File 155:MEDLINE(R)

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11429211 98311728 PMID: 9647922

**A micromanipulator for intraoperative vibratory hearing assessment with an implantable hearing aid transducer ]**

Ein Mikromanipulator für intraoperative vibratorische Hörprüfungen mit einem **implantierbaren** Hörgerätestandler.

Lehner R; Maassen M M; Leysieffer H; Zenner H P

Universitätsklinik für Hals-Nasen-Ohrenheilkunde Tübingen.

HNO (GERMANY) May 1998, 46 (5) p507-12, ISSN 0017-6192

Journal Code: 2985099R

Document type: Journal Article ; English Abstract

Languages: GERMAN

Main Citation Owner: NLM

Record type: Completed

Subfile: INDEX MEDICUS

First concepts of **implantable hearing** aids to be coupled to the ossicular chain are available for patients with combined or sensorineural **hearing loss** (SNHL). To ensure that **hearing** can be improved intraoperative **coupling** of a test **transducer** to the ossicular chain is mandatory for allowing surgical anatomy to be checked and vibratory **hearing** tests to be performed. To achieve this, the test **transducer** has to be held and positioned securely in situ for some minutes, avoiding risks for middle or inner ear structures. This is not possible using conventional surgical instruments. Thus, a **micromanipulator** to hold the test **transducer** during intraoperative **hearing** tests was developed. This surgical device allows the surgeon safe, risk-free, and controlled **coupling** of the test **transducer** to the ossicular chain with one axial and three rotational degrees of freedom. With the aid of a conventional ear retractor (2x2 prongs), the manipulator is fixed at the patient's ear. In conjunction with a piezoelectric test **transducer**, the manipulator was used in nine patients during local anesthesia. The test **transducer** is part of an electronic **hearing implant** (Tübingen **implant**) specifically designed for SNHL that may be coupled to a middle ear ossicle or the perilymph of the cochlea. The **micromanipulator** was easy to handle. It allowed accurate positioning of the test **transducer** in the ear and the desired **coupling** of the **transducer**'s probe tip to the ossicular chain during **auditory** tests. According to the principles of integrated safety, the intraoperative risk of ossicular or inner ear injuries caused, for instance, by the patient's head movement is minimized. The design of the manipulator system is universal, also allowing its use for other electronic **hearing implants** or minimal invasive surgery after minor modifications.

Tags: Human

Descriptors: **Hearing Aids**; \* **Hearing Loss**, Sensorineural  
--rehabilitation--RH; \*Microsurgery--instrumentation--IS; \* **Prostheses and Implants** ; \* **Transducers** ; Ear Ossicles--physiopathology--PP; Equipment Design; **Hearing Loss**, Sensorineural--physiopathology--PP; **Hearing Tests**  
--instrumentation--IS; Surgical Procedures, Minimally Invasive  
--instrumentation--IS; Vibration

Record Date Created: 19980828

Record Date Completed: 19980828

21/9/3 (Item 3 from file: 73)

07240794 EMBASE No: 1998139739

**An osseointegrated manipulator device for the positioning and fixation of implantable hearing aid transducers. Part 1: Adaptation to the surgical**

**anatomy of the temporal bone and surgical aspects**

EIN OSSEOINTEGRIERTER MIKROMANIPULATOR ALS HALTERUNG FUR **IMPLANTIERBARE**  
HORGERATEWANDLER. TEIL 1: ANPASSUNG AN DIE CHIRURGISCHE ANATOMIE DES  
FELSENBEINS UND OPERATIONSTECHNISCHE EIGENSCHAFTEN

1998

Lehner R.; Maassen M.M.; Muller G.; Leysieffer H.; Zenner H.

R. Lehner, Universitats-HNO-Klinik, Silcherstrasse 5, D-72076 Tübingen  
Germany

HNO ( HNO ) (Germany) 1998, 46/4 (311-323)

CODEN: HBZHA ISSN: 0017-6192

DOCUMENT TYPE: Journal; Article

LANGUAGE: GERMAN SUMMARY LANGUAGE: ENGLISH; GERMAN

NUMBER OF REFERENCES: 26

The first electronic **implantable** hearing aids for patients with hearing loss are coupled to the ossicular chain or perilymph during **implantation** and are now available. Our new Tübingen **implant** designed for sensorineural hearing loss (SNHL) is the combination of an **implantable** microphone and piezotransducer. To avoid hearing losses during **implantation**, the Tübingen piezotransducer will be (1) fixed to the mastoid cavity and (2) positioned to one of the ossicular target points. This can be done with a **micromanipulator** which will be **implanted** together with **transducer** and microphone in the mastoid cavity. The manipulator weighs 0.7 g. With four degrees of freedom, it allows highly secure and safe positioning of the **transducer**'s probe tip to the ossicular chain under dose to stereotactic conditions. The main advantages of the present **micromanipulator** are (1) easy handling during surgery, (2) the **transducer**'s precise positioning to the ossicular target point with sufficient degrees of freedom, and (3) the **transducer**'s stable fixation in the mastoid cavity in the final position. Following integrated safety as the leading principle, ossicular or inner ear injuries caused, e.g., by the patient's head movement or unintentional manual contact by the surgeon, are minimized. The **micromanipulator** is, as it were, the surgeon's vibration-free 'artificial hand.' The manipulator's development and its optimization to the mastoid cavity by test **implantation** in 50 human temporal bones are shown in detail. While **coupling** the **transducer** to the body of the incus, **transducer**, microphone, and **micromanipulator** can be **implanted** into 76% of all mastoid cavities without protrusion. In the case of **transducers** **coupling** to the long process of the incus, the protrusion-free **implantation** rate of the above-mentioned three **implant** modules is 78%.

**MEDICAL DESCRIPTORS:**

\* hearing aid; \* **micromanipulator**

microphone; **implantation**; medical instrumentation; surgical anatomy;  
temporal bone; surgical approach; surgical technique; micromanipulation;  
human; article

**SECTION HEADINGS:**

011 Otorhinolaryngology

027 Biophysics, Bioengineering and Medical Instrumentation

21/6/4 (Item 4 from file: 73)

07201208 EMBASE No: 1998063316

**Elements for coupling an implantable hearing aid transducer to the  
ossicles or perilymph by cold deformation**

KALTFLIESENDE ELEMENTE ZUR ANKOPPLUNG EINES **IMPLANTIERBAREN**  
HORGERATEWANDLERS AN GEHÖRKNÖCHELCHEN ODER PERILYMPHE

1998

- 21/6/5 (Item 5 from file: 73)  
07061316 EMBASE No: 1997343172  
An implantable hearing aid for sensorineural hearing loss: First  
implantation of microphone and transducer in patients  
EIN IMPLANTIERBARES HORGERAT FUR INNENOHR-SCHWERHORIGKEITEN.  
KURZZEITIMPLANTATION VON MIKROPHON UND WANDLER  
1997
- 21/6/6 (Item 6 from file: 73)  
07061314 EMBASE No: 1997343170  
Intraoperative evaluation of transfer functions of prototypes of  
implantable hearing aid transducers in humans  
INTRAOPERATIVE BEURTEILUNG DER UBERTRAGUNGSEIGENSCHAFTEN VON PROTOTYPEN  
IMPLANTIERBARER HORGERATEWANDLER AM MENSCHEN  
1997
- 21/6/7 (Item 7 from file: 73)  
07061312 EMBASE No: 1997343168  
Adaption of the geometry of implantable hearing aid components to the  
human temporal bone. Part I: Electromechanical transducer  
ANPASSUNG DER GEOMETRIE IMPLANTIERBARER HORGERATEKOMPONENTEN AN DAS  
MENSCHLICHE FELSSENBEIN. TEIL I: ELEKTROMECHANISCHER WANDLER  
1997
- 21/6/8 (Item 8 from file: 73)  
07061311 EMBASE No: 1997343167  
Animal experiments with a piezoelectrical implantable hearing aid  
transducer in the cat  
IN-VIVO-UNTERSUCHUNGEN EINES PIEZOELEKTRISCHEN IMPLANTIERBAREN  
HORGERATE-WANDLERS AN DER KATZE  
1997
- 21/9/9 (Item 9 from file: 34)  
DIALOG(R) File 34:SciSearch(R) Cited Ref Sci  
(c) 2003 Inst for Sci Info. All rts. reserv.  
06279552 Genuine Article#: YF764 Number of References: 25  
Title: An implantable piezoelectric hearing aid transducer for  
sensorineural hearing loss .2. Clinical implant  
Author(s): Leysieffer H (REPRINT) ; Baumann JW; Muller G; Zenner HP  
Corporate Source: IMPLEX GMBH SPEZIALHORGERATE, MUNCHNER STR 101/D-85737  
ISMANNING//GERMANY/ (REPRINT); UNIV TUBINGEN, KLIN HALS NASEN  
OHRENHEILKUNDE/TUBINGEN//GERMANY/  
Journal: HNO, 1997, V45, N10 (OCT), P801-815  
ISSN: 0017-6192 Publication date: 19971000  
Publisher: SPRINGER VERLAG, 175 FIFTH AVE, NEW YORK, NY 10010  
Language: German Document Type: ARTICLE  
Geographic Location: GERMANY  
Subfile: CC CLIN--Current Contents, Clinical Medicine  
Journal Subject Category: OTORHINOLARYNGOLOGY  
Abstract: A miniature, hermetically sealed **implant** was development and  
manufactured in several clinical and technical iteration steps based on  
the prototype of an **implantable piezoelectric hearing -aid  
transducer** described in Part 1 of the work presented here. The  
**transducer** is made of pure titanium (medical grade 2, ASTM F67) and  
designed to be **implanted** into the mastoid cavity. Transfer of

mechanical oscillations to an ossicle in the middle ear is effected by a fixed directly **coupling** rod of pure titanium or via suitable **coupling** elements. The **transducer** is highly tuned with a resonance frequency in the range of 7-10 kHz, depending on the dynamic mass load. Below this resonance and down to low frequencies, the frequency response of elongation is smooth with a very small ripple of less than +/-1 dB. Unlike the prototype, an increase in vibration amplitude of around 10 dB was achieved for a comparable power consumption. Vibration amplitude at low and middle frequencies is about 60 nm with a **transducer** voltage of 1 V, corresponding to an equivalent sound-pressure level of around 100 dB SPL at up to 1 kHz. At higher frequencies of up to 10 kHz, the output level increases to beyond 130 dB SPL. Nonlinear distortions at maximum Volume (1 V) are extremely small (THD <0.1%) throughout The whole transfer range. Due to an extremely short attack time (50  $\mu$ s) and short **release** time (approximately 2 ms), the dynamic properties of the **transducer** allow good transmission of **audio** signals with fast changes in the time domain, i.e., plosives in speech signals. Electric power consumption at full volume and broadband signals is in the region of 1  $\mu$ W. Unlike electromagnetic **transducers** described in the literature, the low power consumption of this piezoelectric **transducer** allows the realization of fully **implantable hearing** aids for rehabilitation of moderate to severe sensorineural [tearing loss].

Descriptors--Author Keywords: electromechanical **transducer** ; **hearing** aid ; **hearing** improvement ; **hearing** loss ; **implant** ; **implantable hearing aid** ; **implan table recha rgeable battery** ; **implantable micromanipulator** ; mastoid ; medical device ; middle ear ; ossicular chain ; piezoelectric **transducer**; sensorineural; **hearing** loss; TICA

Identifiers--KeyWord Plus(R): MIDDLE-EAR; CAT

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21/6/10 (Item 10 from file: 73)  
07061308 EMBASE No: 1997343164  
An implantable piezoelectric hearing aid transducer for sensorineural hearing loss. Part I: Development of a prototype  
EIN IMPLANTIERBARER PIEZOELEKTRISCHER HORGERATEWANDLER FUR INNENOHRSCHWERHORIGE. TEIL I: ENTWICKLUNG EINES PROTOTYPEN  
1997

21/6/11 (Item 11 from file: 73)  
07061306 EMBASE No: 1997343162  
Fundamental demands on an electromechanical transducer for implantable hearing aids compensating a sensorineural hearing loss. Part I: Technical and audiological demands  
PRINZIPIELLE ANFORDERUNGEN AN EINEN ELEKTROMECHANISCHEN WANDLER FUR IMPLANTIERBARE HORGERATE BEI INNENOHRSCHWER-HORIGKEIT. TEIL I: TECHNISCHE UND AUDIOLOGISCHE ASPEKTE  
1997

21/6/12 (Item 12 from file: 73)  
07061304 EMBASE No: 1997343160  
Active electronic hearing implants for patients with conductive and sensorineural hearing loss - A new era in ear surgery. Part II: Present development  
AKTIVE ELEKTRONISCHE HORIMPLANTATE FUR MITTEL- UND INNENOHRSCHWERHORIGE-EINE NEUE ARA DER OHRCHIRURGIE TEIL II: GEGENWARTIGER ENTWICKLUNGSSTAND  
1997

21/6/13 (Item 13 from file: 73)  
07061303 EMBASE No: 1997343159  
Active electronic hearing implants for patients with conductive and sensorineural hearing loss - A new era in ear surgery. Part I: Basic principles and suggested nomenclature  
AKTIVE ELEKTRONISCHE HORIMPLANTATE FUR MITTEL- UND INNENOHRSCHWERHORIGE EINE NEUE ARA DER OHRCHIRURGIE TEIL I: GRUNDPRINZIPIEN UND NOMENKLATURVORSCHLAG  
1997

21/6/14 (Item 14 from file: 155)  
11629166 99062694 PMID: 9846264  
First implantation of a totally implantable electronic hearing aid in patients with inner ear hearing loss].  
Erste Implantationen eines vollstendig implantierbaren elektronischen Horsystems bei Patienten mit Innenohrschwerhörigkeit.  
Oct 1998

21/6/17 (Item 17 from file: 155)  
11320372 98199880 PMID: 9539053  
Cold deformation elements for attaching an implantable hearing aid transducer to ear ossicles or perilymph]  
Kaltfliessende Elemente zur Ankopplung eines implantierbaren Horgeratewandlers an Gehörknöchelchen oder Perilymphe.  
Jan 1998

21/6/18 (Item 18 from file: 155)  
11184983 98061448 PMID: 9445860  
An implantable hearing aid for inner ear hearing loss. Short-term

implantation of microphone and transducer]  
Ein implantierbares Horgerat für Innenohrschwerhörigkeiten.  
Kurzzeitimplantation von Mikrophon und Wandler.  
Oct 1997

21/6/19 (Item 19 from file: 155)  
11184981 98061446 PMID: 9445858  
Intraoperative evaluation of signal transduction of prototypes of  
implantable hearing aid transducers in the human]  
Intraoperative Beurteilung der Übertragungseigenschaften von Prototypen  
implantierbarer Horgeratewandler am Menschen.  
Oct 1997

21/6/20 (Item 20 from file: 155)  
11184979 98061444 PMID: 9445856  
Adjusting the geometry of implantable hearing aid components to human  
temporal bone. I: Electromechanical transducer]  
Anpassung der Geometrie implantierbarer Horgeratekomponenten an das  
menschliche Felsenbein. Teil I: Elektromechanischer Wandler.  
Oct 1997

21/6/21 (Item 21 from file: 155)  
11184978 98061443 PMID: 9445855  
In vivo studies of a piezoelectric implantable hearing aid transducer  
in the cat]  
In-vivo-Untersuchungen eines piezoelektrischen implantierbaren  
Horgeratewandlers an der Katze.  
Oct 1997

21/6/22 (Item 22 from file: 155)  
11184976 98061441 PMID: 9445853  
An implantable piezoelectric hearing aid transducer for inner ear  
deafness. II: Clinical implant ]  
Ein implantierbarer piezoelektrischer Horgeratewandler für  
Innenohrschwerhörige. Teil II: Klinisches Implantat .  
Oct 1997

21/6/24 (Item 24 from file: 155)  
11184973 98061438 PMID: 9445850  
Principle requirements for an electromechanical transducer for  
implantable hearing aids in inner ear hearing loss. I: Technical and  
audiologic aspects]  
Prinzipielle Anforderungen an einen elektromechanischen Wandler für  
implantierbare Horgerate bei Innenohrschwerhörigkeit. Teil I: Technische  
und audiologische Aspekte.  
Oct 1997

21/6/25 (Item 25 from file: 155)  
11184971 98061436 PMID: 9445848  
Active electronic hearing implants for middle and inner ear hearing  
loss--a new era in ear surgery. II: Current state of developments]  
Aktive elektronische Horimplantate für Mittel- und  
Innenohrschwerhörige--eine neue Ära der Ohrchirurgie. Teil II:  
Genwartiger Entwicklungsstand.  
Oct 1997

21/6/26 (Item 26 from file: 155)  
11184970 98061435 PMID: 9445847  
Active electronic cochlear implants for middle and inner ear hearing loss--a new era in ear surgery. I: Basic principles and recommendations on nomenclature]  
Aktive elektronische Horimplantate fur Mittel- und Innenohrschwerhörige--eine neue Ära der Ohrchirurgie. Teil I: Grundprinzipien und Nomenklaturvorschlag.  
Oct 1997

21/7/23 (Item 23 from file: 155)  
DIALOG(R) File 155: MEDLINE(R)  
(c) format only 2003 The Dialog Corp. All rts. reserv.  
11184975 98061440 PMID: 9445852  
An implantable piezoelectric hearing aid transducer for inner ear hearing loss. I: Development of a prototype]  
Ein implantierbarer piezoelektrischer Hörgerätestandwandler für Innenohrschwerhörige. Teil I: Entwicklung eines Prototypen.  
Leysieffer H ; Baumann J W; Müller G; Zenner H P  
Universitätsklinik für Hals-Nasen-Ohrenheilkunde, Tübingen.  
HNO (GERMANY) Oct 1997, 45 (10) p792-800, ISSN 0017-6192  
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Implantable hearing aids can form the basis of new surgical techniques for dealing with hearing problems originating in the inner ear, provided they are fully implantable. Accordingly, a comprehensive, interdisciplinary, combined project was initiated at the ENT clinic of the University of Tübingen which was to conclude with operations to improve hearing via fully implantable hearing aids. A novel electromechanical transducer for implantable hearing aids based on the piezoelectric principle is described. Unlike the piezoelectric transducers reported so far, this transducer does not rely on the bimorphic principle but on a circle-shaped, heteromorphic combination system consisting of a piezoceramic disc and metal membrane. The transducer can be hermetically sealed and is designed for implantation into the mastoid. Transfer of mechanical oscillations to an ossicle in the middle ear is effected by a directly fixed coupling rod or via suitable coupling elements. The transducer is highly tuned with a resonance frequency at the upper end of the spectral transfer range (greater than 10 kHz). Below this resonance and down to low frequencies, the frequency response of elongation is smooth with amplitudes of around 20 nm. At low and middle frequencies of up to 1 kHz, these vibration amplitudes correspond to sound-pressure levels of around 90 dB SPL. At higher frequencies of up to 10 kHz, the output level increases to about 130 dB SPL. Nonlinear distortions are also very small at the highest levels (less than 0.1%) throughout the whole transfer range. Electric power consumption at maximum levels is in the range of a few microwatts and is therefore significantly lower than that of electromagnetic systems. Particularly, this makes it possible to use the transducer in fully implantable hearing aids for rehabilitation of sensorineural hearing loss.

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